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MARS BULLETIN

NOV. 1949
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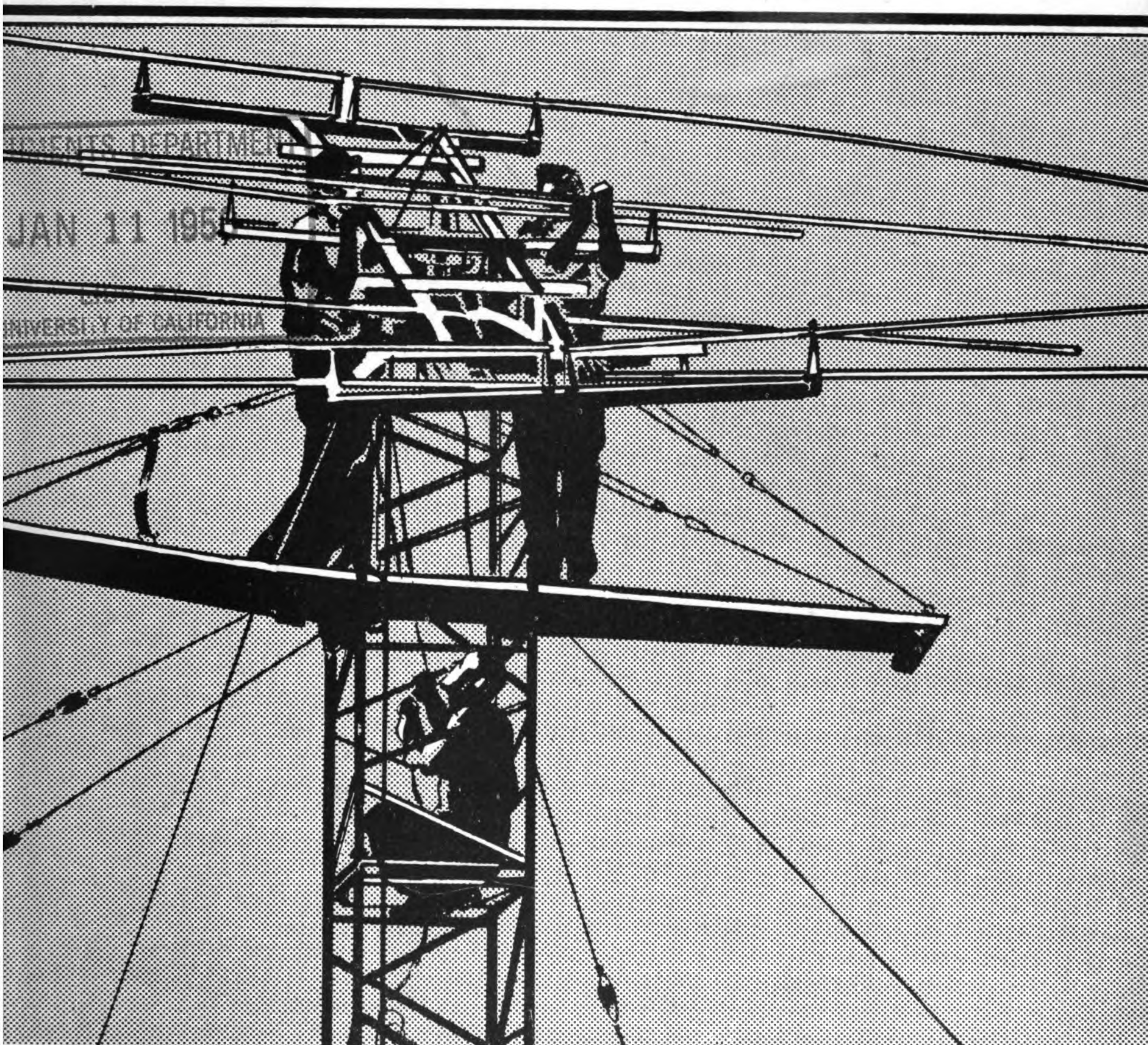

Military Amateur Radio System

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MARS BULLETIN

NOVEMBER 1949

VOLUME I NUMBER 1

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Published by Maj. Gen. S. B. Akin, the Chief Signal Officer, Department of the Army, and Maj. Gen. Francis L. Ankenbrandt, Director of Communications, United States Air Force, at the Pentagon, Washington 25, D. C.

OCTOBER 1949
NOVEMBER 1949

CQ . . . CQ . . . CQ . . .

This, the first issue of the MARS BULLETIN, is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The Bulletin will be distributed to all members. It will be prepared in the Offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate Chief; either to Chief, MARS-Army, room 5B519, the Pentagon, Washington 25, D. C., or Chief, MARS-USAF, room 5C165, the Pentagon, Washington 25, D. C.

EDITORIAL

In this first issue of the MARS BULLETIN, we wish to thank those radio amateurs who, by combining their skills to form the Military Amateur Radio System, represent a bulwark of our country's defense at a critical time, and whose cooperation makes this publication possible.

We've found the steady growth in MARS membership during the few months that the system has been operating most encouraging and we hope through this publication to make membership more and more attractive to radio amateurs. Thus, we hope, our roster will grow, and grow, and GROW.

Since a cooperative effort of this sort can remain healthy only when there is a free and frequent exchange of opinion, we invite the members of MARS to make MARS BULLETINS their medium of self-expression. Suggestions and constructive criticism are welcome. This is your bulletin, please use it.

We plan, in MARS BULLETINS, to give you the information you want in concise, authoritative, interesting language. Our objectives are—

1. To disseminate instructions pertaining to MARS, the promulgation of which is not required through command channels.
2. To publish articles of a technical or general nature pertaining to signal communications equipment developments, techniques and procedures, equipment modification, and other subjects of interest to a MARS member.
3. To publish articles written by members which are of general interest in electronics or of specific interest to the MARS.
4. To stimulate interest in experimenting with electronics equipment and to provide a medium through which results of such experiments may be offered to the Department of the Army and the Department of the Air Force.
5. To create an interest in military signal communications and other electronic activities.

We'd appreciate it if you'd write to tell us if we're succeeding—or if we're not.

FIRST MARS-ARMY MEMBER

Maj. Griffin L. Davis, Chief of the Motion Picture Branch, Army Pictorial Service Division, Office of the Chief Signal Officer, Washington, D. C., was the first to join the Military Amateur Radio System.

"Griff" operates W4NGX in Arlington, Va. He started hamming it in 1935 with the call W5FJM. His radio experience began with the Field Artillery at Fort Sam Houston, Tex., where he served with the Second Division as radio operator, radio chief, communications chief, and first sergeant. He was using W200X in 1942. In 1946–47 he was licensed as J2AAQ, Tokyo, Japan, the call he used while overseas.

HOW TO JOIN MARS

Here's your invitation to join MARS (Military Amateur Radio System) if you're not already a member. The MARS was activated 26 November 1948 by Special Regulations 105–75–1 and Air Force Regulation 102–3.

Membership in MARS is open to any individual affiliated with the military, who's on active duty in Army or Air Force, or a member of

the civilian components, provided he is a licensed amateur. The objectives of the Military Amateur Radio System are—

1. To create interest and further training in military radio communications.

2. To coordinate practices and procedures of amateur radio operations with those of military radio communications.

3. To provide an additional source of trained radio communications personnel in the event of a local or national emergency.

MARS will follow those channels of command currently prescribed for components of the United States Army and the United States Air Forces respectively.

Qualified amateurs may obtain further information and application forms as follows:

1. Amateurs residing in New York, Vermont, Rhode Island, New Hampshire, Maine, Massachusetts, Connecticut or New Jersey should apply to—

Commanding General, First Army
Governors Island
New York 4, New York
ATTN: Signal Officer

or

Commanding General
Headquarters, First Air Force
Mitchel Air Force Base, New York
ATTN: MARS—Air Force Director

2. Amateurs whose residence is in the following States—Pennsylvania, Ohio, Kentucky, West Virginia, Maryland, Virginia, Delaware or the District of Columbia, should send their applications to—

Commanding General
Second Army
Fort George G. Meade, Maryland
ATTN: Signal Officer

or

Commanding General
Headquarters, 9th Air Force
Langley Air Force Base
Langley Field, Virginia
ATTN: MARS—Air Force Director

3. If you live in Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, or Florida and want a MARS membership, you should apply to—

Commanding General
Third Army
Fort McPherson, Georgia
ATTN: Signal Officer

or

Commanding General
14th Air Force
Warner-Robins AFB, Georgia
ATTN: MARS—Air Force Director

4. Those who live in Oklahoma, Texas, New Mexico, Arkansas, or Louisiana should send their applications to—

Commanding General
Fourth Army
San Antonio, Texas
ATTN: Signal Officer
or
Commanding General
12th Air Force
Brooks Air Force Base
San Antonio, Texas
ATTN: MARS—Air Force Director

5. Amateurs who reside in Wyoming, Colorado, Kansas, Nebraska, Missouri, Iowa, North Dakota, South Dakota, Minnesota, Wisconsin, Illinois, Indiana, or Michigan, should send their applications to—

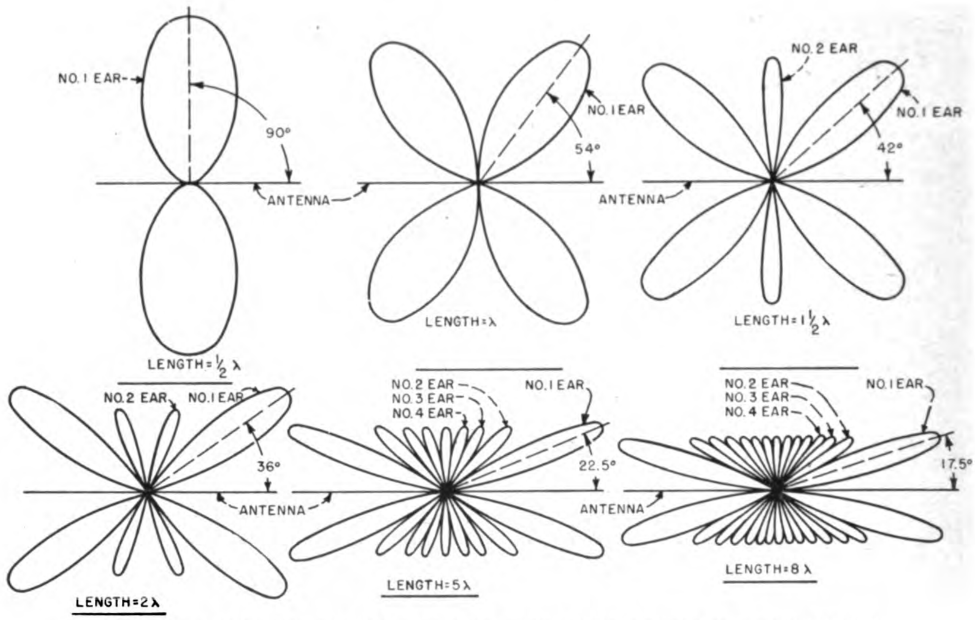
Commanding General, Fifth Army
1660 East Hyde Park Boulevard
Chicago 15, Illinois
ATTN: Signal Officer
or
Commanding General, 10th Air Force
Fort Benjamin Harrison
Indianapolis, Indiana
ATTN: MARS—Air Force Director

6. Amateurs who are residents of Washington, Oregon, California, Nevada, Arizona, Idaho, Montana, or Utah should send their applications to—

Commanding General
Sixth Army
San Francisco, California
ATTN: Signal Officer
or
Commanding General, Fourth Air Force
Hamilton Air Force Base
Hamilton Field, California
ATTN: MARS—Air Force Director

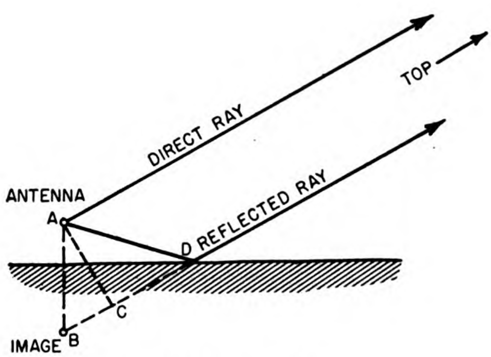
Meet the No. 1 Martians.

Two reasons why the Military Amateur Radio System is a first-rate example of armed forces unification are Capt. E. L. Nielsen, W4ODI, Chief of MARS—Army, and Maj. R. H. Ralls, W4RB, Chief of MARS—Air Force. The two chiefs coordinate top-level planning of the MARS.

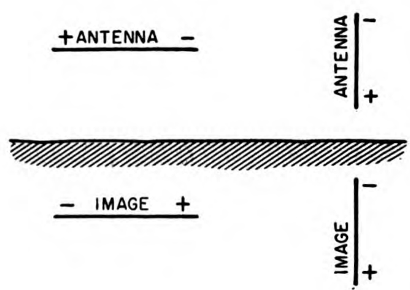


POLAR DIAGRAMS SHOWING STRENGTH OF FIELD RADIATED IN VARIOUS DIRECTIONS FROM ANTENNA CONSISTING OF A WIRE REMOTE FROM THE GROUND.

FIGURE 1.

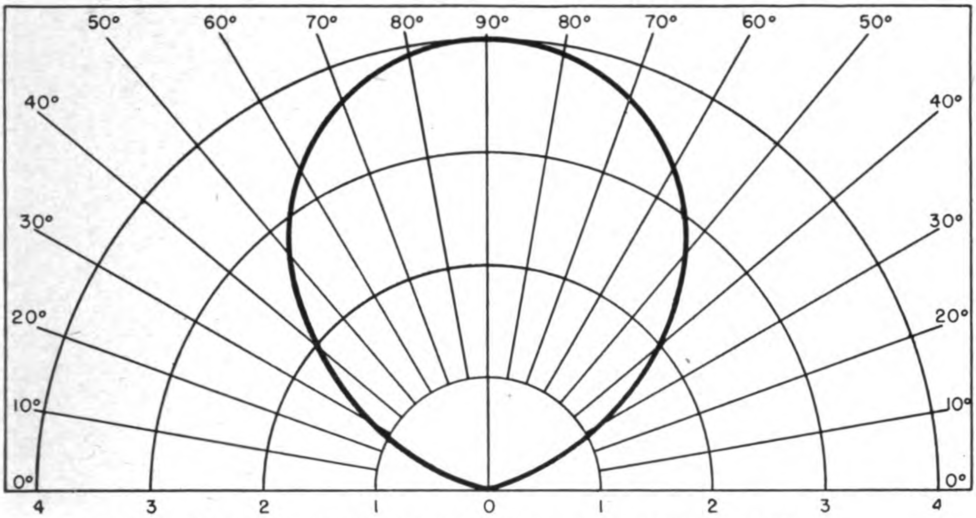


AT ANY DISTANT POINT, P, THE FIELD STRENGTH WILL BE THE RESULTANT OF TWO RAYS, ONE DIRECT FROM THE ANTENNA, THE OTHER REFLECTED FROM THE GROUND. THE REFLECTED RAY TRAVELS FARTHER THAN THE DIRECT RAY BY THE DISTANCE BC, WHERE THE REFLECTED RAY IS CONSIDERED TO ORIGINATE AT THE "IMAGE" ANTENNA.



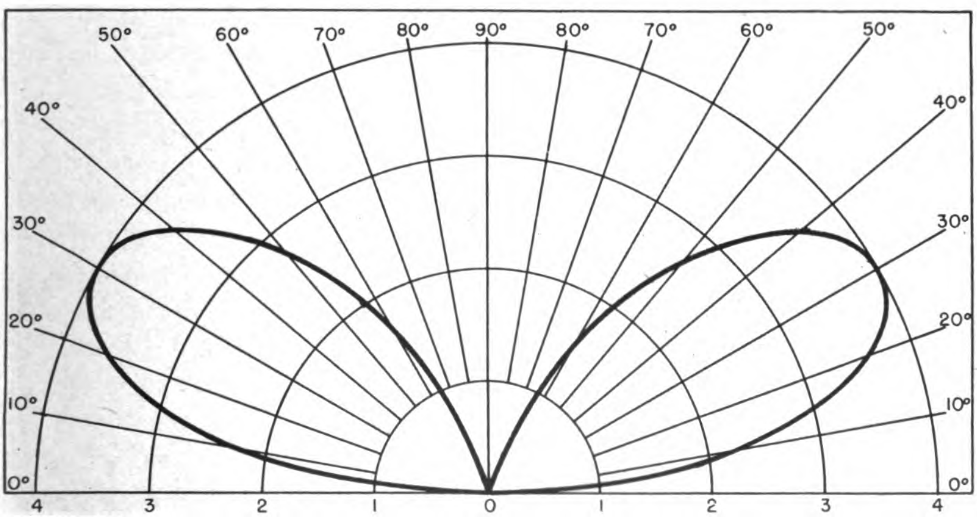
HORIZONTAL AND VERTICAL HALF-WAVE ANTENNAS AND THEIR IMAGES.

FIGURE 2.



IN DIRECTION OF WIRE; HEIGHT ONE-FOURTH WAVE LENGTH

FIGURE 3.



AT RIGHT ANGLES TO WIRE; HEIGHT ONE-HALF WAVE LENGTH

FIGURE 4.

INTRODUCTION TO ANTENNAS

By ALTON HART, *Radio Engineer, WAR, W3AX*

NOTE.—Since most fixed radio installations of modern design utilize special antennas, some having marked directional characteristics, I've prepared this article covering antennas, in everyday language to clear up possible bug-a-boos. I intend, later, to discuss rhombic, parasitic, sterba, etc., antennas. In the meantime, let's have your comments and recommendations. What antenna would you like to have discussed? Do you have some dope of interest to the gang? Drop me a line at the Office of the Chief Signal Officer, Department of the Army, Washington 25, D. C.—Al.

I. INTRODUCTION

In transmission, a directional antenna assures maximum radiation toward the receiving station and thus, with a given amount of transmitted power, assures the maximum signal at the distant point. In the broad sense it might be said that less transmitted power is required to produce the desired signal at a given point when a directional antenna is used. At the receiving station, a directional antenna offers an equally important advantage since noise, arriving from points not within the desired direction, is discriminated against as compared with those points towards which the antenna's directivity is asserted and from which the signal is arriving. It is the signal to noise ratio at the receiving station that determines the effectiveness of reception, and the directional antenna allows this ratio to be favorable to an extreme, as compared to nondirectional antennas. This combination of transmitter power economy and increased signal to noise ratio at the receiver has made it possible to establish many radio circuits and accomplish QSO's which otherwise would have been unsound economically and technically.

Directivity is obtained by so designing and locating the transmitting antenna that maximum radiation occurs in a given desired direction. The radiated energy, thus concentrated, forms what is termed a "beam," and a polar projection of such a beam used in plotting the radiation pattern on a chart is called a "lobe." As will be shown later, the shape of the lobe is a resultant obtained by the (vector) addition of waves from different sections of the antenna so that reinforcement occurs in a desired direction, and partial or almost complete cancellation in other directions.

Directional antennas of many types have been designed and effectively utilized. The most commonly used directional antenna for the Signal Corps radio circuits is the rhombic (or diamond) antenna. In some locations, however, where it is not feasible to erect the four tall poles required by a rhombic, when difficulties arise in procuring them or in acquiring ground acreage, the "inclined V" antenna (also called the "Sloping V") may be substituted. This antenna requires only one tall pole which can be erected in a few hours with a small force of men. Its directional qualities are excellent; in over-all efficiency, measured in the terms of practical results, it is indeed "a close second" to the rhombic antenna.

II. PROPAGATION OF RADIO WAVES

To understand the directional characteristics of an antenna (in this case the "inclined V"), it might be well to review, briefly, how radio waves are propagated and how a radiation pattern is determined. Then we can see how this pattern is varied or distorted to create a "lobe" with marked directional characteristics. As an example, let's assume that a half-wave antenna is suspended horizontally in space where it is unaffected by any other object or by the ground. The current in such an antenna is, of course, not uniform but reaches its maximum value at the center (this is called a "loop" or "antinode") and minimum value at the two ends (called the "nodes"). The current sets up magnetic lines of force which completely encircle the antenna. The magnetic field created by the current is also maximum at the center. Maximum radiation takes place at that point and minimum radiation from the ends. In this theoretical, space-suspended antenna, radiation would be at right angles to and would encircle completely the entire device; and, if the radiation strength were plotted, the plane directed diagram formed would be similar to that shown in accompanying diagrams. This is one form of radiation pattern. The line in the center represents the antenna, and the two circles on either side represent the perfect lobes. The lengths of lines A and B represent the relative field strength in a particular direction. Note that the field strength is maximum at right angles to the wire.

Though a plane diagram generally is used to demonstrate the radiation lobe, a somewhat clearer picture of the body of the lobe may be gained by referring to figure 1. Here the plane diagram is shown as part of the full "doughnut" pattern that is formed by the many lines of radiation emanating from the antenna. Note that the maximum radiation takes place in a line perpendicular to the center of the antenna (the latter being represented by the line through the center of the doughnut) and that as the angle decreases from 90°, the radiation also decreases.

The wave front of the radiated wave lies principally in the horizontal plane, and the waves are polarized in the same plane as the antenna. Thus a horizontal antenna emits horizontally polarized waves; a vertical antenna emits vertically polarized waves. Hence, the position of the antenna determines its polarization. A horizontally polarized wave for high-frequency operation generally is preferred since much of the noise that affects radio reception is vertically polarized. Thus a horizontally polarized receiving antenna will discriminate to a large extent against the unwanted interference which is vertically polarized.

The radiation pattern just discussed is practically impossible to obtain. A number of factors that cannot be eliminated, such as the earth itself, are omnipresent. Other factors, such as additional radiators, directors and/or reflectors, may or may not be present; in fact, these factors often are introduced deliberately in order to distort the pattern in a particular manner to obtain directivity. Still other important factors are the length of the antenna itself, the degree of inclination from the horizontal or vertical positions, and the height of the antenna above the ground.

Let's first consider the effect of the earth (or ground) upon radiation pattern. The earth acts like a great reflector upon all waves that strike it, in a fashion similar to the way a mirror reflects light waves. In both cases the angle of reflection is equal to the angle of incidence. Thus a wave that strikes the earth at an angle of 20° is reflected upward at exactly that angle. The importance of this action lies in the fact that the reflected wave combines with a directly emitted wave, either in phase or out of phase, to varying degrees. When they are in phase, the effective radiation strength is increased positively. When they are out of phase, the effective radiation is decreased. The resultant wave, therefore, may be increased or decreased. This increase or decrease in turn causes the radiation pattern to be affected as illustrated in figure 1. The action is as though an image antenna were directly below the antenna proper but within the earth and, like any image, it acts as if it were reversed. This will be understood better if you look at figure 1. In this figure, if one side of the horizontal antenna is polarized positively at any instant, the image antenna on that side will be polarized negatively. If the vertical antenna at a given instant is positive at its base, the upper portion of its image will be positive. Thus, the currents appearing around the vertical antenna and its image are in phase, while those appearing around the horizontal antenna and its image are 180° out of phase. Hence, variations from the vertical or horizontal will affect the phase relationship and the resultant radiation pattern. Since, in the role of a conductor mother earth is a very bad actress, reflection losses

occur; and this factor, too, affects the pattern by reducing the maximum reflection factor and preventing zero nulls from being obtained.

The height above ground is another factor affecting the radiation pattern, since the angles of reflection and incidence (and the resultant wave angle) are affected directly by it. Let me emphasize at this point that the *relative* intensity of radiation at various vertical angles will depend upon the free space pattern and the modifications brought about by the reflection factor of the earth. The latter, in turn, is affected by the degree of the earth's conductivity and the height of the antenna above ground. Remember that the actual earth ground level and the reflective earth ground level are not always one and the same. The effect of height upon the radiation pattern is shown in the accompanying diagrams (figs. 3 and 4). You can see that where conditions permit the height should be chosen to assure concentration of radiation at the vertical angle most siutable for the frequency used, with consideration given to distance, time, and wave propagation.

Up to this point, I've been discussing antennas of comparatively short lengths, and we've seen how their radiation patterns (and their resultant directivity) are affected by various factors. The example given of a half-wave antenna demonstrated that maximum radiation occurred broadside to the wire and that the lobe formed was subject to modification by reflection as antenna height was varied. Now, we can understand some of the happenings up in the "sky piece" and we begin to realize that practically all antennas evolve from the basic simple little quarter- or half-wave dipole. Subsequent articles will substantiate this statement. In my next article, I'll take up a long-wire antenna and attempt to clarify some of its characteristics.

Signing a Mars Certificate.

Maj. Gen. S. B. Akin, Chief Signal Officer, Department of the Army, takes an active interest in the Military Amateur Radio System. He personally signs each Mars—Army membership certificate as it is issued by the Chief, Mars—Army.

MARS ADVISORY COMMITTEE.

Members and observers at the first meeting of the MARS Advisory Committee. Seated, left to right: Lt. Col. W. O. Jefferson, Sig P & D (M); G. K. Rollins, W3GA, Chief, Radio Operator and Amateur Division, F. C. C. (M); Lt. Col. Steven S. Cerwin, Sig P & O, W4ITY (M); Capt. E. L. Neilsen, Chief, MARS—Army, W4ODI (M); Brig. Gen. K. B. Lawton OCSigO; Maj. Gen. F. L. Ankenbrandt, Director of Communications, USAF; Col. H. F. Gregory, USAF, W3CO (M); Capt. T. Biggs, USAF, W3KNZ (M); Lt. Col. L. A. Mason, USAF, W4OHI (M). Standing, left to right: Col. A. B. Pitts, OCD. W3BI (M); I. Brownstein, Legal Division, F. C. C.; Maj. B. B. Dales, Sig P & T (M); Maj. C. F. Welch, USMC (Navy), ex-W6BBK; Col. L. H. Stanford, OCD; F. E. Handy, W1BDI, Communications Manager, ARRL (M); R. W. Percy, W4IQR, Chief, Amateur Radio Service Section, F. C. C.; Maj. R. H. Ralls, Chief, MARS—USAF, W4RB (M); Lt. Col. D. W. Eddy, Army Communications Service Division. USAF Committeemen or alternates not present were: Lt. Col. L. C. Sheetz, W4LEK, Committee Chairman; Lt. Col. H. H. Moreland, ex-W5BYE; Lt. Col. M. E. Willson, W4LDX.

FIRST ARMY.

Lt. Col. R. J. McKithan, Signal Corps, presents MARS certificate to Lt. Col. David E. Talley, W2PF, at Armed Forces Communications Association meeting at the 7th Regiment Armory, New York City.

SECOND ARMY.

Sgt. First Class Linville C. Dula, W3NOP, operates W3USA, Second Army Headquarters Amateur Radio Station.

Third Army.

Col. Charles L. Olin, Signal Officer, 3d Army, looks on as Maj. Gen. William C. Chase, 3d Army Chief of Staff, presents Mars certificate to Mars Director, Capt. James A. Long, at Fort McPherson, Ga.

Col. Carl H. Hatch, Signal Officer, USARPAC, talks with K4USA, Washington, D. C., from KH6USA, Fort Shafter, Oahu, T. H. Present for the contact are Mrs. Marion Stewart and MARS Director Maj. Elmer R. Higgins.

A SWING 'ROUND THE CIRCUIT

Traffic Nets listed for Army Headquarters are initial net groups. They are for c-w transmission and will operate on assigned frequencies. In all cases the capabilities of equipment and the operating hours have been taken from questionnaires. Members unable to participate as assigned should request reassignment.

TRAFFIC NETS

First Army Personnel

Signal Officer—Col. P. A. Wakeman
MARS *Director*—Maj. G. S. Morris

1. FIRST ARMY NET—Tuesdays 0100Z—6997.5 kc. and Thursdays 0001Z—6997.5 kc. NCS—A2USA.
2. METROPOLITAN NEW YORK NET—Wednesdays 0100Z—6997.5 kc. NCS—A2SAF.
3. MASSACHUSETTS NET—Tuesdays 0200Z—3497.5 kc. NCS—A1WAB.
4. LONG ISLAND, RHODE ISLAND, CONNECTICUT NET—Fridays 0001Z—6997.5 kc. NCS—A2EQD.
5. NEW HAMPSHIRE, VERMONT, MAINE NET—Wednesdays 0200Z—3497.5 kc. NCS—A1OIL.
6. NEW JERSEY NET—Thursdays 0200Z—3497.5 kc. NCS—A2MON.
7. UPPER NEW YORK STATE NET—Mondays 0001Z—6997.5 kc. NCS—A2LRW.

Second Army Personnel

Signal Officer—Col. A. Pulsifer
MARS *Director*—Robert Richardson

1. SECOND ARMY NET—Tuesdays 0200Z—4097.5 kc. NCS—A3USA.
2. DELAWARE STATE NET—Wednesdays 0300Z—3497.5 kc. NCS—A3WR.
3. KENTUCKY STATE NET—Tuesdays 0400Z—3497.5 kc. NCS—A4MO.
   District 1—Wednesdays 0100Z—6997.5 kc. NCS—A4VP.
   District 2—Wednesdays 0400Z—3497.5 kc. NCS—A4NY.
   District 3—Wednesdays 0400Z—6997.5 kc. NCS—A4MPA.
   District 4—Thursdays 0400Z—3497.5 kc. NCS—A4KGV.
4. MARYLAND STATE NET—Wednesdays 0200Z—3492.5 kc. NCS—A3NT.
   District 1—Thursdays 0100Z—3492.5 kc. NCS—A3ECP.
   District 2—Mondays 0200Z—3492.5 kc. NCS—A3KIZ.
5. OHIO STATE NET—Tuesdays 0300Z—3492.5 kc. NCS—A8GDC.
   District 1—Tuesdays 0100Z—3492.5 kc. NCS—A8SCM.
   District 2—Thursdays 0200Z—3492.5 kc. NCS—A8QVW.
   District 3—Thursdays 0200Z—3497.5 kc. NCS—A8TSD.
6. PENNSYLVANIA STATE NET—Wednesdays 0100Z—4097.5 kc. NCS—A3ANK.
   District 1—Thursdays 0200Z—4097.5 kc. NCS—A3KDF.
   District 2—Mondays 0001Z—4097.5 kc. NCS—A3WAA.
   District 3—Tuesdays 0100Z—6997.5 kc. NCS—A3LTA.
7. VIRGINIA STATE NET—Tuesdays 0001Z—3492.5 kc. NCS—A4FJ.
   District 1—Mondays 0100Z—3492.5 kc. NCS—A4NGX.
   District 2—Wednesdays 0001Z—3492.5 kc. NCS—A4KYD.
   District 3—Thursdays 0001Z—3492.5 kc. NCS—A4KIL.
   District 4—Thursdays 0100Z—6997.5 kc. NCS—A4OEM.
8. WEST VIRGINIA STATE NET—Tuesdays 0200Z—3492.5 kc. NCS—A8CLX.

Third Army Personnel

Signal Officer—Col. Reginald P. Lyman
MARS *Director*—Maj. Harold B. Lynn

1. THIRD ARMY NET—Tuesdays 0300Z—3497.5 kc. NCS—A4USA.
2. FLORIDA—Wednesdays 0200Z—3497.5 kc. NCS—A4KQP.
3. GEORGIA—Tuesdays 0200Z—3497.5 kc. NCS—A4WAR.
4. MISSISSIPPI—Fridays 0300Z—3497.5 kc. NCS—A5IBO.
5. SOUTH CAROLINA—Fridays 0200Z—3497.5 kc. NCS—A4WAD.
6. TENNESSEE—Saturdays 0200Z—3497.5 kc. NCS—A4NNJ.
7. ALABAMA—Thursdays 0300Z—3497.5 kc. NCS—A4WAE.
8. NORTH CAROLINA—Thursdays 0200Z—3497.5 kc. NCS—A4WSC.

Fourth Army Personnel

Signal Officer—Col. R. B. Moran
MARS *Director*—Lt. Jack Thompson

1. FOURTH ARMY NET—Fridays 0100Z—6997.5 kc. NCS—A5USA.
2. TEXAS STATE NET—Wednesdays 3459Z—6997.5 kc. NCS—A5BUV.
3. NEW MEXICO STATE NET—Thursdays 0500Z—3497.5 kc. and Fridays 0100Z—6997.5 kc. NCS—A5ZU.
4. NORTH NEW MEXICO NET—Wednesdays 0100Z—6997.5 kc. NCS—A5OIA.
5. SOUTH NEW MEXICO NET—Wednesdays 0100Z—3497.5 kc. NCS—A5OCK.
6. OKLAHOMA NET—Fridays 2300Z—6997.5 kc. NCS—A5MOA.
7. LOUISIANA NET—organization not completed.
8. ARKANSAS NET—organization not completed.

Fifth Army Personnel

Signal Officer—Col. G. H. Palmer
MARS *Director*—Capt. F Sheviak

1. FIFTH ARMY NET—Wednesdays 0400Z and Thursdays 0600Z—3497.5 kc. NCS—A9USA.

2. HOTROD NET—Indiana and Michigan—Mondays 0100Z and Tuesdays 0200Z—2028 kc. Wednesdays 0100Z and 0200Z—6997.5 kc. NCS—A9PDS.

3. LAKELAND NET—Wisconsin and Minnesota—Mondays 0100Z and Tuesdays 0200Z—2020 kc. Wednesdays 0200Z—0300Z—3497.5 kc. NCS—A9LZU.

4. METROPOLITAN NET—Illinois—Mondays 0200Z and Tuesdays 0300Z—2010 kc. Thursdays 0200Z and 0300Z—3497.5 kc. NCS—A9BIN.

5. COWPOKE NET—Colorado, Wyoming, North Dakota, and South Dakota—Mondays 0200Z and Tuesdays 0300Z—2028 kc. Thursdays 0300Z—0400Z—3497.5 kc. NCS—AØJPW.

6. BREADBASKET NET—Nebraska and Kansas—Mondays 0300Z and Tuesdays 0400Z—2020 kc. Thursdays 0100Z and 0200Z—6997.5 kc. NCS—AØHSO.

7. MIDLAND NET—Iowa and Missouri—Mondays 0300Z and Tuesdays 0400Z—2010 kc. Wednesdays 0300Z and 0400Z—3497.5 kc. NCS—AØLKK.

Sixth Army Personnel

Signal Officer—Col. L. C. Parsons
MARS *Director*—Lt. Harold H. Haas

1. HAWAII NET—Mondays, Wednesdays, and Fridays 0300Z—1440.5 kc.
2. SIXTH ARMY NET—Thursdays 0400Z—6997.5 kc. NCS—A6USA.
3. MONTANA NET—Thursdays 0300Z—3497.5 kc. NCS—A7JTZ.

4. Washington Net—Mondays 0200Z—3497.5 kc. NCS—A7GNR.
   District 1—Thursdays 0600Z—3497.5 kc. NCS—A7KA.
      Local Net 1—Tuesdays 0500Z—3497.5 kc. NCS—A7EBH.
      Local Net 2—Fridays 0400Z—3497.5 kc. NCS—A7CJC.
   District 2—Fridays 0600Z—3497.5 kc. NCS—A7CAY.
      Local Net 1—Wednesdays 0500Z—3497.5 kc. NCS—A7MIS.
      Local Net 2—Fridays 0500Z—3497.5 kc. NCS—A7LSH.
5. Nevada—not assigned.
6. Oregon Net—Fridays 0300Z—3497.5 kc. NCS—A7KEG.
   District Net 1—Mondays 0400Z—3497.5 kc. NCS—A7BUS.
   District Net 2—Mondays 0500Z—3497.5 kc. NCS—A7LI.
7. Utah—Thursdays 0300Z—3497.5 kc. NCS—A7FST.
8. California—Wednesdays 0500Z—6997.5 kc. NCS—A6AZ.
   District 1—Tuesdays 0400Z—3497.5 kc. NCS—A6ZXY.
      Local Net 3—Thursdays 0400Z—3497.5 kc. NCS—A6ZQL.
      Local Net 4—Wednesdays 0400Z—6997.5 kc. NCS—A6AUQ.
      Local Net 5—Wednesdays 0600Z—3497.5 kc. NCS—A7EZC.
   District 2—Mondays 0600Z—3497.5 kc. NCS—A6PQ.
      Local Net 1—Wednesdays 0400Z—3497.5 kc. NCS—A6QIU.
      Local Net 2—Tuesdays 0600Z—3497.5 kc. NCS—A6FRE.
9. Arizona—Wednesdays 0200Z—3497.5 kc. NCS—A7LHI.
10. Idaho—Wednesdays 0300Z—3497.5 kc. NCS—A7KXJ.

USARPAC Personnel

Signal Officer—Col. T. J. Cody
Mars *Director*—Maj. E. R. Higgins

1. Operating nets are not completed for USARPAC.
2. Schedules are maintained with A6USA and with K4USA, ZI, and with KG6EK, Guam (for relay to Tokyo), so traffic for any Far East personnel can be expedited through A6USA and K4USA.

THE GISMO TWINS.

Technical Sgt. Harry T. Simms, W4HBT, ex-W6HBT, and Master Sgt. George L. Nuttall, W4PEL, continue the never-ending argument as to which is the best tube to use in the final; or if not that, which is the best crystal oscillator arrangement. George and Harry, regular ops at AIR and rag chewers and brass pounders at K4AF, spend all their spare time building needed items for Headquarters, USAF, MARS station, which is located in room 5–D–181, Pentagon Building, Washington 25, D. C.

THE BOEHME TWINS.

Mat and Jim hold down the heavy operating at AIR, Headquarters MARS station and second in brass over K4AF, during their idle moments. Mat is the keying head and handles all the code practice transmissions in addition to the evening nets on MARS frequencies. Jim handles the daytime schedules and relieves Mat for furloughs. Jim's full title is Staff Sgt. James M. Williams, W4OST, and Mat's is Staff Sgt. Ira W. Matteson, W4OWH.

SOMETIMES THE BRASS GOES IN FOR PHONE.

Brig. Gen. Ivan L. Farman, Deputy Director of Communications, Department of the Air Force, is obviously pleased when he checks out the 100-watt operating position at K4AF. Headquarters, USAF, amateur station. The general's hamming dates from the spring of 1920, at which time the R. I. in Los Angeles awarded him his first ticket with the call 6MG. His most recent hamming before his Pentagon assignment was as J2ATC.

First Air Force Personnel

Director of Communications—Lt. Col. Otto G. Quanrud
MARS *Director*—Maj. Lehman W. Rahn

1. NET 1—Headquarters First Air Force and NCS of nets 2, 3, 4, and 5.
2. NET 2—Massachusetts, Vermont, Maine—Tuesdays 0001Z—6997.5 kc.; Thursdays and Saturdays 0001Z—14405 kc. NCS—AF1JXE.
3. NET 3—Connecticut and Rhode Island—Tuesdays 0001Z—14405 kc.; Thursdays and Saturdays 0200Z—3497.5 kc. NCS—AF1BDI.
4. NET 4—Northern New York—Tuesdays 0100Z—6997.5 kc.; Thursdays and Saturdays 0001Z—6997.5 kc. NCS—AF2WIW.
5. NET 5—Southern New York and Northern New Jersey—Tuesdays 0100Z—14405 kc.; Thursdays and Saturdays 0100Z—6997.5 kc. NCS—AF2UQB.

Ninth Air Force Personnel

Director of Communications—Lt. Col. Kenneth W. Klise
MARS *Director*—Lt. William Beckwith

Nets not yet established.

Fourteenth Air Force Personnel

Director of Communications—Col. Carroll S. Miller
MARS *Director*—Col. Carroll S. Miller

Nets not yet established.

Twelfth Air Force Personnel

Director of Communications—Lt. Col. Fredrick W. Shipe
MARS *Director*—Chief Warrant Officer Denzil S. Overman

1. TWELFTH AIR FORCE NET—Wednesdays 0500Z—6997.5 kc.; Thursdays 0100Z—3497.5 kc.; Thursdays 0300Z—14405 kc.; Fridays 1900Z—6997.5 kc. NCS—AF5FAK.
2. LOUISIANA RED NET—(northern half Louisiana, Arkansas and Oklahoma)—Mondays 1900Z—6997.5 kc.; Tuesdays 0200Z—3497.5 kc.; Thursdays 001Z—14405 kc. NCS—AF5BAF.
3. LOUISIANA BLUE NET—(southern half Louisiana)—Mondays 2000Z—3497.5 kc.; Tuesdays 0200Z—6997.5 kc.; Wednesdays 0400Z—14405 kc. NCS—AF5BPL.
4. TEXAS RED NET—(northeastern half Texas)—Mondays 0600Z—3497.5 kc.; Tuesdays 0001Z—14405 kc.; Wednesdays 1700Z—6997.5 kc. NCS—AF5DZ.
5. TEXAS BLUE NET—(southwestern half Texas)—Mondays 0300Z—14405 kc.; Wednesdays 2400Z—3497.5 kc.; Thursdays 0200Z—6997.5 kc. NCS—AF5FSP.

Tenth Air Force Personnel

Director of Communications—Maj. Sten E. Sjogren
MARS *Director*—First Lt. Walter S. Brown

No net schedule available.
Frequencies used—3497.5, 3498.75, and 3601.5.
NCS for each State—

Minnesota—AFØLIB
Colorado—AFØIC
Kansas—AFØVG
Missouri—AFØNMR
Illinois—AF9FYK

Indiana—AF9SII
Michigan—AF8CHO
Iowa—AFØNAY
Wisconsin—AF9RSR

Fourth Air Force Personnel

Director of Communications—Col. Gus B. Hoffman
MARS *Director*—Capt. Kermit R. Parker

CALIFORNIA NET—Wednesdays 0300Z—6997.5 kc. NCS—AF6WET.

CENTRAL DISTRICT NET—Wednesdays 0600Z—3497.5 kc. NCS—AF6FNS.

SOUTHERN DISTRICT NET (California south of 35th parallel)—Fridays 0300Z—6997.5 kc. NCS—AF6FAB.

Members interested in research and experimentation will be grouped together by field of interest and their activities discussed via a net composed of their own group on an assigned MARS frequency. A group leader will be elected to conduct seminars on the air using any approved type of emission. Study groups now planned include—

1. Antenna and propagation.
2. High frequency.
3. Design and equipment.
4. High speed manual and automatic operation.
5. Radio teletype.

"HAM" RADIO THERAPEUTICS

Lt. Robert ("Bob") Richardson, Military Amateur Radio System Director for the Second Army, is sold on the possibilities of occupational therapy as furnished by a portable rig. Hospitalized recently with a recurrent leg injury of long standing, Bob decided his favorite avocation—ham radio—would speed his recovery.

To the dismay of his doctors and the hospital staff, the Second Army gang trundled in Bob's powerful little 5-watter and an Army receiver, and in no time at all the hospital pigeons were treated to the sight of a 40-meter doublet swinging gently in the breeze.

One of the more venturesome birds flew up and landed on the sill to investigate a strange phenomenon. As the nurse came in with the penicillin, Bob was heard to mutter softly, "Give it to me in my left arm; I have to key this rig with my right."

MARS OPERATING NOTES

The American Radio Relay League has extended an invitation to all MARS stations to participate in the league-sponsored traffic nets. The chiefs, MARS, feel it is incumbent upon all MARS members to join at least one of the existing nets sponsored by the league.

During the summer months most of the 80-meter nets have QPW due to QRN, but there has been a shift of activity to 40-meter operation. Col. F. E. Handy, A. R. R. L. communications manager, told the chiefs, MARS, that the following list of nets is as "accurate as possible, but it is reasonable to assume there will be some attrition and some new nets added by the time all nets are back in operation." All nets are expected to be in operation by the third week in September, Handy said.

Listed below, by States, are the networks, frequencies, days, and time these nets are active. All times shown are local times.

ALABAMA:		
AENB	3715	7 p. m. daily.
AENP	3955	6 p. m. Monday—Friday.
AENZ	7220	7 p. m. Monday—Friday.
ARIZONA:		
Arizona Fone Net	3865	7 p. m. daily.
Arizona State Net	3515	7 p. m. daily.
Arizona State Net (slow speed)	3757	7 p. m. Monday—Friday.
ARKANSAS:		
Arkansas Emergency Net	3885	6 a. m. Monday.
Ozark C. W. Net	3695	7 p. m. Monday—Friday.

CALIFORNIA:		
Diablo Net	3885	8 p. m. daily.
Pioneer Net	3725	7, 10 p. m. Monday—Friday.
Mission Trail Net	3854	7 p. m. daily.
Southern California Net	3765	8 p. m. Monday—Friday.
Southern Border Net	3550	8 p. m. Monday—Saturday.
COLORADO:		
Colorado Utility Net	3540	7:30 p. m. Monday—Friday.
CONNECTICUT:		
Nutmeg Net	3640	7 p. m. Monday—Friday.
Connecticut Emergency Net	3640	7 p. m. Saturday—Sunday.
Connecticut Valley Net	29250	9 a. m. Thurdsday.
DELAWARE:		
Md-Del-DC Section Net	3650	7:30 p. m. Monday—Wednesday—Friday.
FLORIDA:		
East Florida Traffic Net	3675	7:30 p. m. Monday—Friday.
Florida Emergency Fone Net	3910	6:15 p. m. Tuesday.
Gator Net	7290	
Palmetto Net	3675	7:30 p. m. Monday—Friday.
GEORGIA:		
Cracker Emergency Net (c. w.)	3705	8 p. m. Monday—Wednesday—Friday.
Cracker Emergency Net	3995	8:30 a. m. Sunday.
IDAHO:		
Gem Net	3745	9 p. m. Monday—Wednesday—Friday.
Pi Net Work	7250	7 p. m. Tuesday—Thurdsay.
ILLINOIS:		
ILN	3765	6:15 p. m. Monday—Friday.
Illinois Emergency Net	3940	7 p. m. Tuesday—Thurdsay. 9 a. m. Sunday.
INDIANA:		
Indiana CW Net	3656	6:30 p. m. Monday—Friday.
Indiana Phone Net	3905	6:30 p. m. Tuesday—Thursday. 9 a. m. Sunday.
IOWA:		
Tall Corn Net	3560	6:45 p. m. Monday—Friday.
Iowa 75 Fone Net	3970	12:30 p. m. Monday—Saturday.
KANSAS:		
Kansas Phone Net	3920	6:45 p. m. Tuesday—Thurdsay.
Kansas Traffic Net	3610	6:45 p. m. Monday—Wednesday—Friday.
KENTUCKY:		
KYN	3600	7 p. m. Monday—Saturday, 9 a. m. Sunday.
KYP	3955	7 a m. Monday—Friday.
Kentucky Emergency Net (Mc.)	145. 8	7 p. m. daily.
LOUISIANA:		
Louisiana Section Net	3635	Monday—Friday.
MAINE:		
Pine Tree Net	3550	7 p. m. Monday—Friday.
Sea Gull Net	3961	5:15 p. m. Monday—Friday.

MARYLAND:		
Md-Del-DC Section Net	3650	7:30 p. m. Monday—Wednesday—Friday.
MASSACHUSETTS:		
Eastern Massachusetts Net	3747	7 p. m. Monday—Friday.
East Massachusetts Net Slow Speed.	3745	6:15 p. m. Monday—Friday.
Western Massachusetts Net	3760	7 p. m. Monday—Friday.
MICHIGAN:		
Michigan QMN Net	3663	6, 7 p. m. Monday—Friday.
Buzzards Roost Net	3930	5:30 p. m. Monday—Friday.
Michigan Emergency Net	3930	9 a. m. Sunday.
MINNESOTA:		
Minnesota State CW Net	3795	7 p. m. Monday—Saturday.
Minnesota State Phone Net	3892	6:15 p. m. Monday—Saturday.
MISSISSIPPI:		
Magnolia Emergency Net	3870	8 p. m. Wednesday.
MISSOURI:		
Missouri Traffic Net	3755	7 p. m. Monday—Friday.
Missouri Emergency Net	3905	10 a. m. Sunday. 7:30 p. m. Monday—Wednesday—Friday.
MONTANA:		
Montana State Net		8:30 p. m. Sunday—Tuesday—Thursday.
NEBRASKA:		
Nebraska Traffic Net	3745	7 p. m. Monday—Friday.
Nebraska Phone Net	3983	12:30 p. m. Monday—Saturday.
NEVADA:		
NEW HAMPSHIRE:		
New Hampshire CW Traffic Net	3685	7 p. m. Monday—Friday.
NEW JERSEY:		
Jersey Net	3630	9 p. m. Monday—Friday.
Northern New Jersey Net	3630	7 p. m. Monday—Saturday.
Southern New Jersey Net	3700	7:30 p. m. Monday—Wednesday—Friday.
New Jersey 75-meter Emergency Fone Net.	3900	9 a. m. Sunday.
NEW MEXICO:		
New Mexico Traffic Net	3705	7 p. m. Monday—Friday.
NEW YORK:		
NLI Net	3710	7 p. m. Monday—Friday.
NYS Net	3720	7 p. m. Monday—Saturday.
NLI Emergency Net	3600	7 p. m. Monday—Friday.
NORTH CAROLINA:		
North Carolina Net	3605	7:15 p. m. Monday—Friday.
NORTH DAKOTA:		
North Dakota Net	3525	8:30 p. m. Monday—Wednesday—Friday.
West North Dakota Net	3670	8:30 p. m. Monday—Wednesday—Friday.
North Dakota 75 Fone Net	3860	3 p. m. Sunday.

OHIO:		
Buckeye Net	3730	7:30 p. m. Monday—Friday.
Dog House Net	3860	6 p. m. Monday.
Ohio Emergency Corps	3725	8:30 p. m. Monday.
Ohio Emergency Net	3860	6:30 p. m. Thursday.
Ohio River Emergency Net	3860	8 a. m. Sunday.
OKLAHOMA:		
Oklahoma Traffic Net	3682	8 a. m. Monday—Friday.
Oklahoma Phone Net	3860	8 a. m. Sunday.
OREGON:		
Round-up City Net	3910	7:30 p. m. daily.
PENNSYLVANIA:		
Eastern Pennsylvania Traffic Net.	3785	6:30 p. m. Monday—Friday.
Western Pennsylvania ORS Net	3750	6:30 p. m. Monday—Friday.
Polecat Net	3665	11:30 a. m. Sunday.
RHODE ISLAND:		
Rhode Island Net	3540	7 p. m. Monday—Friday.
SOUTH CAROLINA:		
South Carolina 80 CW Net	3525	9 p. m. Monday—Friday.
SOUTH DAKOTA:		
South Dakota Section Net	3720	8 p. m. Monday—Wednesday—Friday.
TENNESSEE:		
Tennessee CW Net	3737	7:30 p. m. Monday—Friday.
TEXAS:		
South Texas Traffic Net	3750	8 p. m. Monday—Wednesday—Friday.
South Texas Emergency Net	3840	6:30 p. m. Monday.
North Texas Traffic Net	3651. 2	8 p. m. Monday—Wednesday—Friday.
North Texas Emergency Corps Net.	3930	8 a. m. Sunday.
Northeast Texas Emergency Corps Net.	3880	8 a. m. Sunday.
Northwest Texas Emergency Corps Net.	3950	8 a. m. Sunday.
UTAH:		
Farm Net	3935	7 p. m. Monday—Friday.
VERMONT:		
Vermont CW Net	3740	7 p. m. Monday—Saturday.
Vermont Fone Net	3860	7 p. m. Monday—Friday.
VIRGINIA:		
Virginia Net	3680	7 p. m. Monday—Friday.
WASHINGTON:		
Washington Section Net	3695	7:15 p. m. Monday—Friday.
WARTS Net	3970	7 a. m., 12 noon, 6 p. m. daily.
WEST VIRGINIA:		
West Virginia Net	3770	7:30 p. m. Monday—Friday.
WISCONSIN:		
Badger Emergency Net	3950	6 p. m. daily.
Wisconsin State Net	3775	6:30 p. m. Monday—Friday.

WYOMING TRUNK LINES:		
A	3565	10 p. m. Monday—Friday.
C	3790	8:30 p. m. Monday—Friday.
F (Pioneer Net)	3725	7 p. m. Monday—Friday.
G	3600	10:30 p. m. Monday—Friday.
I	3690	8 p. m. Monday—Friday.
J	3780	7 p. m. Monday—Friday.
K	3755	9:30 p. m. Monday—Friday.
L	3615	10 p. m. Monday—Friday.
NATIONAL TRUNK LINE	3670	9 p. m. Monday—Friday.

Attention is invited to use of JANAP procedures. Stations operating as MARS stations on MARS frequencies using MARS prefix will use JANAP procedures at all times except in instances where a communication emergency exists necessitating cross-band operation with amateurs (that is, military frequency to amateur frequency). At such times amateur procedures will be used.

PROPAGATION DATA FOR MARS USE WITHIN THE UNITED STATES

The following list of usable times and frequencies is prepared and based on 100 watts RF Carrier power delivered to a half-wave antenna mounted 30 feet above the earth. Type of service is CW. All times are local time in your area.

OCTOBER 1949

FREQUENCY

Distance (miles)	3497.5 kc.	6997.5 kc.	14405 kc.
250	00–08 1400–00	09–19	----------
500	00–06 18–00	08–21	12–14
750	00–05 21–00	00–02 06–10 14–00	09–17
1,000	01–05	00–08 15–00	08–19
1,500	----------	00–05 21–00	0630–21

NOVEMBER 1949

Distance (miles)	3497.5 kc.	6997.5 kc.	14405 kc.
250	00–11 13–00	0730–2130	----------
500	00–08 16–00	07–22	11–16
750	00–0730 21–00	00–03 0730–00	08–18
1,000	0030–05	00–0830 15–00	08–20
1,500	----------	00–07 1830–00	07–22

Carl Nielsen, Captain ORC, and ORC Unit Instructor Adam Komosa, operate Nielsen's station at Louisville as part of Kentucky Military District Net.

AIR FORCE SUPPLY NOTES

A big step forward is the release of a considerable quantity (enough for every present member and then some) of obsolescent Air Force communications equipment, to the membership for modification and adaptation to work in the amateur spectrum and on MARS frequencies.

This has been a time-consuming job since the Chief, MARS, Air Force, had to capture the matériel from War Assets Administration and from surplus Air Force stocks in Air Matériel Depots and then initiate necessary paper work to obtain permission from the Deputy Chief of Staff, Matériel and the Director of Finance, Comptroller, of the Air Force to modify the equipment and to drop accountability, when modified, to the extent that the equipment loses its original identity.

Screening of this matériel was begun on 19 July at Warner Robins Air Force Base at Macon, Ga., by the Chief, MARS, USAF, and a number of Air Force MARS Directors. These Air Force and Major Command MARS Directors will be the final authority as to the types and quantities of equipment each member is entitled to receive, with authorized issues being based on the individual's interest and his ability to modify and make the best use of the equipment. For instance, those interested in UHF gear will get first priorities on any surplus of this type, while the 40-meter CW men will naturally get first choice on any BC–454, BC–459, or BC–453.

It is not the intent to furnish the MARS member with a complete store-bought station to take home, plug in the wall, and be on the air forthwith. But for the men interested in design and construction, it *is* desired to make the components available with a free rein to do whatever the Handbook or their imagination dictates.

Most of the equipment will be given to the member on an issue slip and accountability dropped at once. The Air Matériel Command, the supply agency for the Air Force, has informed all supply officers of the special handling of this type of MARS matériel so that the members' actual needs do not wind up in an accountability "*snafu.*" The MARS Air Force or Major Command Director is in for all the work load and is the keeper of the jacket file. Don't impose on him or give him a bad time if he doesn't give you a couple of spares for your little brother.

It isn't necessary for the MARS member to be on active duty to draw the equipment. So it follows that it may be taken off the base. If it were not for this provision, it would be impossible for the reservist to get much benefit out of the equipment. This is the beginning of the expansion of the MARS program into fields other than just straight CW net operation.

A lot of the equipment will be suitable for CW operation on the ham bands but there will be bits and pieces suitable for such things as single side-band filters, code-practice oscillators and cathode-ray tubes to build scopes, pan adaptors and television receivers. While most of the cathode ray tubes have a persistency too great for television reception, the hams who live in a sunny climate may leave them out in the bright sunshine for a few months and have one just made to order.

As a matter of reciprocity the MARS members are expected to send in their hints and kinks and modifications to the Chiefs, MARS, to be published in the MARS BULLETIN.

Any MARS member who has been assigned a MARS call with an AF prefix is eligible to draw this equipment. Don't initiate any requisitions. See your MARS director, in person, or over the nets on regular schedule.

The matériel is being warehoused with accessibility to air transport in mind so that members under the Air Force or Major Command making distribution could hitch a ride in, pick out their gear, and take it back to the home base. For instance, Maj. Larue Rexroat, the MARS Director for Walker Air Force Base at Roswell, N. Mex., could hitch a ride up to the Strategic Air Command Headquarters at Offutt Air Force Base at Omaha, Nebr., and draw equipment for the dozen odd hams at Walker who are members of the MARS program there. This also applies to the Air National Guard and to the Air ROTC. There's nothing like getting in one's required flying time and at the same time some sweet pieces for the junk box.

MARS members who are in inactive reserve and a far piece from the Air Force Headquarters will be required to pay express charges on any matériel shipped to them since there are no Air Force transportation funds for this purpose.

This doesn't go on forever, fellows. There's just 1 year of grace. The special privilege ends on 30 June 1950.

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MARS BULLETIN

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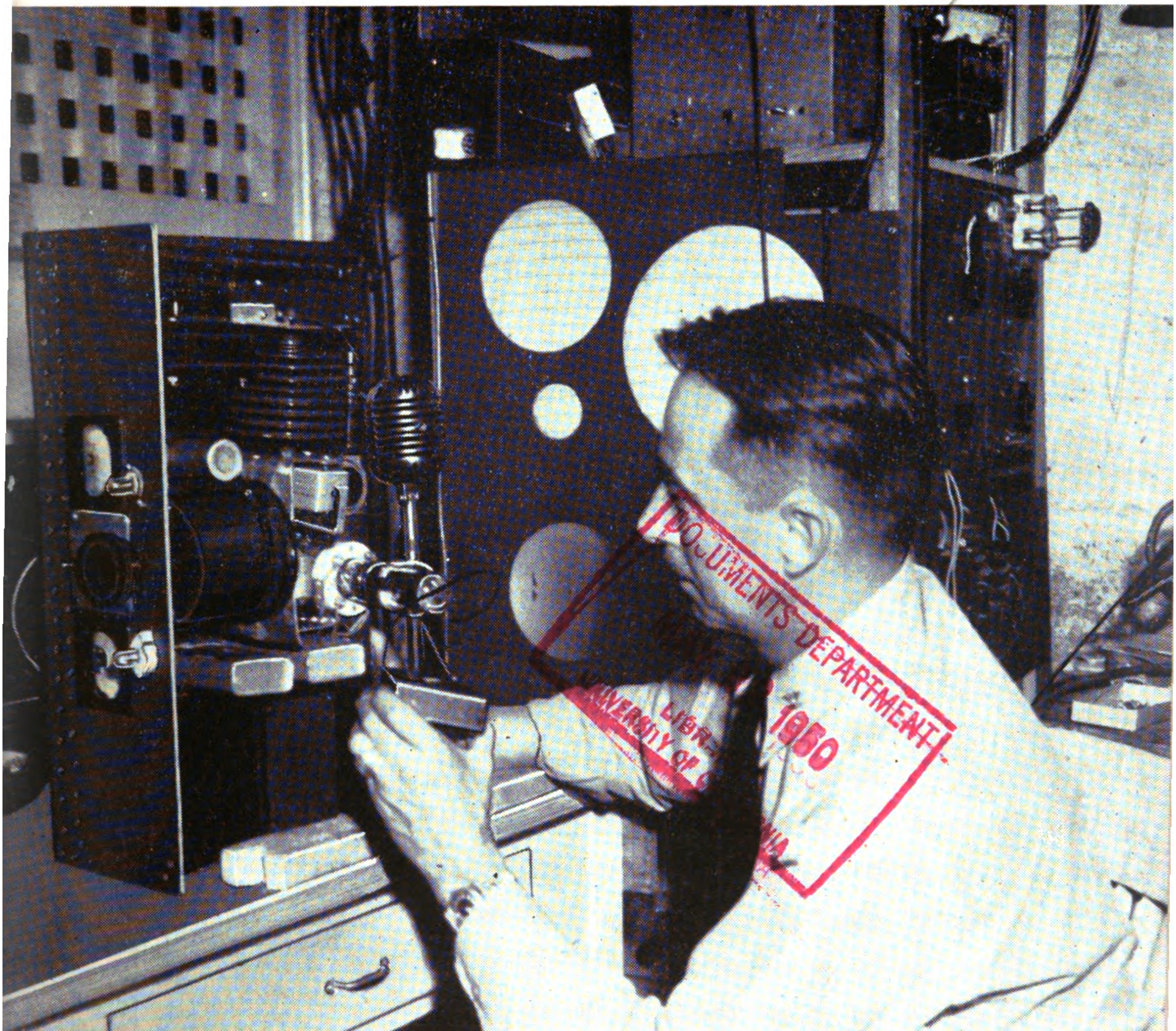

Military Amateur Radio System

In This Issue:
JANUARY FLOOD EMERGENCY REPORT

PENTAGON BUILDING, WASHINGTON, D. C.

ARMED FORCES DAY CONTEST RULES

Eligibility . . . Any amateur radio station licensed by the FCC or by the Armed Forces of the United States is eligible to compete in the Armed Forces Day contest.

Rules . . . The following contest rules will apply:

a. General calls will be used as follows:

1. CW—"CQ AD."
2. Fone—"CQ Armed Forces Day."

b. All amateur bands, either fone or cw may be used.

c. General operation and message procedure will conform to standard amateur practices.

d. Single and multi-operator stations will be considered separately for purposes of scoring the contest.

e. All contest logs will be sent to Room 5B519, the Pentagon, Washington 25, D. C., postmarked before midnight 30 May 1950.

Scoring . . . Points will be scored as follows:

	Points
a. Each QSO.	1
b. Originating one message addressed to anyone other than the station called. (No station will receive credit for more than one originated message during the contest period.)	10
c. Receiving a message for relay or delivery.	2
d. Transmitting (relaying) a message.	2

e. A multiplier of 2 will be used for all points earned while using emergency power for transmitting and receiving—emergency power is defined as any power supply other than that drawn from commercial facilities. (See sample log inside back cover.)

f. Working the same station on more than one band will not count. When a station is worked a second time credit may be received only for the message.

ARMED FORCES DAY QSO PARTY, MAY 20, 1950

Time	*Start*	*End*
PST	0900	2100
MST	1000	2200
CST	1100	2300
EST	1200	2400
GCT	1700	0500 (May 21)

MARS BULLETIN

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VOLUME I NUMBER 2

ABOUT THE COVER: Captain William V. Davis, Director of Flight Test at the Patuxent, Maryland, Naval Air Station, is also a MARTIAN. You'll find more about him on page 29.

CONTENTS

CQ . . . CQ . . . CQ . . .

The Military Amateur Radio System is a joint Army—Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control.

The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate Chief; either to Chief, MARS-Army, Room 5B519, the Pentagon, Washington 25, D. C., or Chief, MARS-USAF, Room 5C165, the Pentagon, Washington 25, D. C.

EDITORIAL

This is the second issue of the MARS BULLETIN. It is bigger and, *we think,* better than the first. But then, the MARS organization is bigger and, we think, better than it was when the first BULLETIN appeared.

We want to develop this medium of expression so that it will be of interest and information to all radio amateurs who are interested in military communication.

It has been shown beyond doubt that concerted action, together with complete cooperation, can bring results. Amateur radio is faced with problems of increased activity without a corresponding increase in frequency allocations. TVI, biggest bugaboo in hamdom today, is forcing amateurs everywhere to "sharpen up" their sets or risk losing their social standings in the community. Therefore, it behooves amateurs everywhere to concentrate on improving methods and becoming more efficient. We want the MARS BULLETIN to help you become more efficient. That is why MARS Headquarters earnestly requests readers to make criticisms or suggestions for improving the MARS BULLETIN.

Moving into the second year of MARS operations, MARS Chiefs can look back and point with pride to first-year achievements. The MARS has grown from zero to an 2200-station system. In a world-wide radio broadcast over the MARS networks, the Honorable Louis A. Johnson, Secretary of Defense, hailed the MARS as "further proof of teamwork among the services."

Mr. Johnson also said, "With membership open to any individual in the military service, organized reserve corps, National Guard, or ROTC, who possesses a valid amateur radio operator's license, MARS is becoming larger and more proficient every day."

LOOKING AHEAD—ARMED FORCES DAY

A lot of you MARS members, and many other amateurs, have been wondering what unification would do to your favorite Army Day, Navy Day, or Air Force Day program. Well, you can rest easily now. The first joint observance by all three services comes up May 20th, and present planning shows that you'll not lose a thing. Steps are being taken to incorporate the better features of all individual Service Days into one big *super duper* Armed Forces Day program for the radio amateur.

The Navy Day code copying contest, long a popular feature in ham circles, is being revived as an Armed Forces Day receiving competition. A greeting to the amateurs from the Secretary of Defense, the Honor-

able Louis A. Johnson, will be broadcast over 13 military frequencies (5 MARS and 8 Navy) in the International Morse Code at 25 w. p. m. A Certificate of Merit will be issued to each listener who copies the message solid and sends it to MARS Headquarters. Here's your chance to get a beautiful piece of wallpaper for your home station. The frequencies and transmission times will be found inside the back cover, marked in GCT and in standard time for your convenience.

But That's Not All. . . . We're going to have a QSO and Message Relay Contest also. Emphasis is going to be placed on traffic handling and additional points will be given for use of emergency power (that is, any power which does not come from a commercial source).

To help us plan for future communications needs in times of disaster or emergency, we want to stress the short-haul traffic handling circuits, both A–1 and A–3 emission.

Every MARS member is urged to participate in this Armed Forces Day contest to the fullest degree. This is OUR day, both as amateurs and as affiliates of the military.

In today's technological world, a national emergency would necessitate full mobilization of the Nation's technical strength. The Military Amateur Radio System, by furnishing a pool of trained radio men—all well versed in military communications procedures—expects to play a vital part in focusing electronic and communications skills on the job of defense.

MINIATURIZATION

Increasing emphasis on miniaturization of RF coil components (chokes, IF transformers, discriminators, etc.) has spurred research and development activity in the coil and magnetic materials fields. Two new development contracts have been awarded—General Electric Company is developing miniature IF transformers, video transformers, and RF coil impregnants. Automatic Manufacturing Company is developing a subminiature IF transformer suitable for automatic assembly to printed circuits. Another contract is in effect with General Ceramics and Steatite Corporation covering the study and evaluation of ferrite type RF magnetic materials.

INDUSTRIAL MOBILIZATION

The Office of the Chief Signal Officer has announced agreements with dry battery manufacturers determining what their production would be for the Armed Forces in case of emergency. According to the Signal Corps, which procures dry batteries for all the Armed Services, a survey preceding the mobilization agreements reveals the industry to be in good shape, having expanded and modernized its facilities since World War II.

JANUARY FLOOD REPORT FROM OWENSBORO, KY.

Because of its intrinsic interest to emergency operators everywhere, the following letter report on Ohio River emergency operations during January is printed in its entirety.

22 January 1950
511 Griffith Avenue
Owensboro, Ky.

SUBJ: MARS Operations during flood emergency

TO: MARS Director, Hq Second Army
Ft. George G. Meade, Maryland

THRU: State NCS, MARS
Mr. Carl W. Nielsen
434 Cornell Place
Louisville, Ky.

This report covers activities of local MARS operators during the recent flood along the Ohio and Green Rivers.

On Friday evening, January 13th, the Red Cross asked Mr. Dave Tooley, W4LUB, Emergency Coordinator for the Owensboro area, for assistance in the Green River flood area around Calhoun, Ky. A meeting was held that evening to make plans for providing communications. At that time I was at a National Guard meeting and consequently didn't find out what was going on until later the next day.

Saturday morning, January 14th, W4JXB, W4NIX, (A4NIX), and W4OYI (A4OYI) went to Calhoun, Ky. with portable radio equipment. They took with them 2 battery-powered TCS–12 transmitter-receiver units running about 25 watts power which were furnished by the local Naval Reserve and some SCR–536 handie-talkies furnished by the National Guard. Upon arrival in Calhoun, they set up a station operating as W4JXB/4 in the McLean County court house. Communications were established with K4NRR, operated by W4PFQ, at the Naval Reserve Armory in Owensboro. They decided to operate on a frequency of 3885 kc since that was the frequency that the handie-talkies were on. Saturday afternoon W4LTQ and W4NZO went to Calhoun to assist there. W4LUB relieved W4PFQ at K4NRR and when I found out what was going on, I went to K4NRR and assisted there.

Much trouble was experienced trying to operate on 3885 kc due to the poor selectivity of the Navy receivers in use at K4NRR and due to interference from other amateur stations. Most of the time at K4NRR was spent trying to keep the channel clear so that information could be obtained from W4JXB/4. Weather reports, river stages, and Navy, Coast Guard, and Red Cross traffic were handled.

At 1700 the Red Cross informed the hams that their service would not be required during the night and operations were suspended.

Early Sunday morning, January 15th, W4NIX (A4NIX) and myself went to Calhoun and put into operation a TCS–12 under the call W4NIX/4 and W4JXB in Owensboro was contacted as NCS, 3885 kc being the frequency in use at that time. In view of the previous day's experience, it was decided to put our portable equipment on 4085 kc and operate under the call A4NIX. This plan proved very successful and A4NIX was able to keep in contact with stations in Owensboro throughout the day. In order to conserve batteries, contacts were made on an hourly schedule as traffic was not heavy. Stations in Owensboro who monitored our frequency were W4JXB, W4LTQ, W4LUB, and W4PFQ. Weather reports, Coast Guard and Red Cross traffic and flood victim welfare messages were handled by A4NIX, using both voice and CW. The situation Sunday turned out to be less urgent than anticipated and by evening it was apparent that the services of the hams could be dispensed with. A4NIX and I then concluded the activities and returned to Owensboro.

While the emergency did not become very serious, the hams in this vicinity got some excellent practice operating under emergency conditions and would have been prepared to handle the situation had it become critical.

Several lessons were to be learned out of this operation. First, MARS frequencies provide clear channels which are invaluable for operating low-power portable equipment during emergencies. Second, every ham has at least a moral obligation to his community to attain and maintain a code proficiency sufficient to handle traffic on CW when voice circuits fail. Third, commercial communications receivers should be used, if at all possible, as they have much better selectivity than found in Navy models and in portable equipment.

Listed below are the calls of all who assisted in this operation. I think the list is complete, but someone may have been inadvertently omitted.

W4BEW	W4LUB	W9GWL
W4JEI	W4MMY	W9TSS
W4JQY	W4NIX (A4NIX)	K4NRR
W4JUI	W4NZO	K9NAI
W4JXB	W4OYI (A4OYI)	
W4KBY	W4PDW (A4PDW)	
W4LJO	W4PFQ	
W4LTQ		

/s/ John R. Somerville, Jr.
JOHN R. SOMERVILLE, JR.
1st Lt., CE, Ky NG
A4PDW

BARBARA LAKEY.

"TOAST WITH JAM" IS FIRST MARS YL

Note. Although one other YL actually preceded Mrs. Lakey as a MARS operator, she was not then nor is she now, a member of the MARS. Private Eddie Williams, Women's Army Corps, was assigned to K4USA/WAR at MARS Headquarters, Washington, D. C. While at K4USA Private Williams married Sgt. 1 cl Tom Davey of Fort Monmouth, New Jersey. Pvt. Williams' enlistment was up in October and the couple now lives at Fort Monmouth.

Barbara L. Lakey (A2TWJ–W2TWJ) is the Military Amateur Radio System's first YL. The former Military Intelligence Division radio operator expresses good taste in her call; she usually signs "Toast With Jam."

Barbara, married and a housekeeper in her new home at Kew Gardens, New York, finds time for so many activities it leaves the average person breathless just thinking about it.

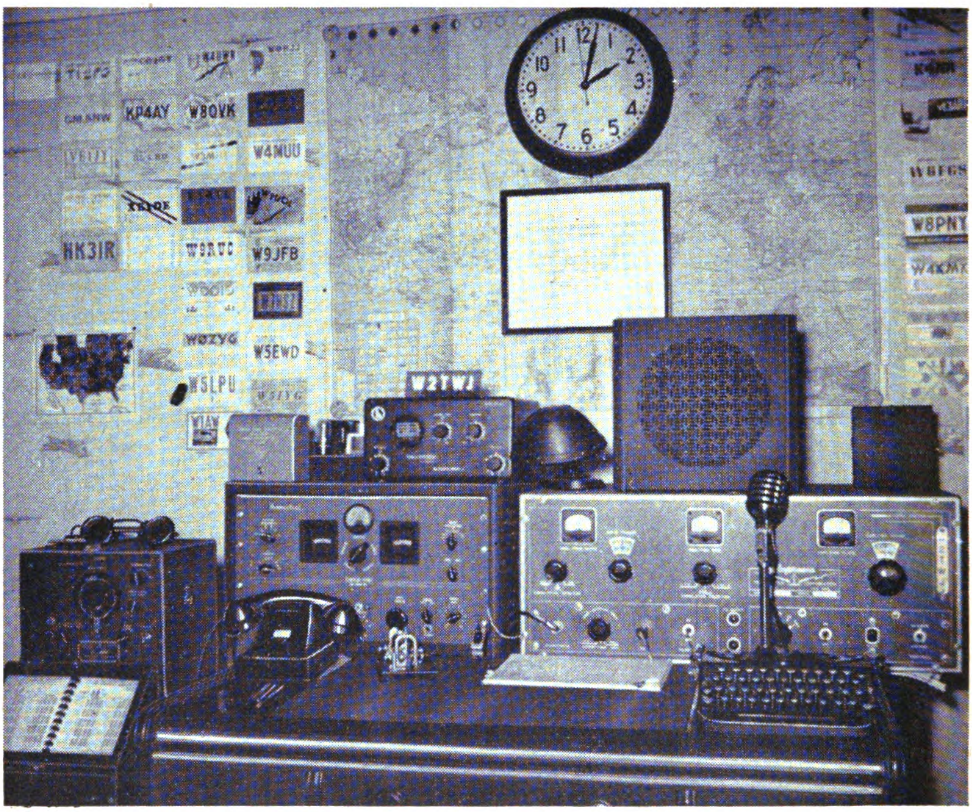
She's a registered apprentice with the New York State Board of Pharmacy and assists her OM, Don (W2WHT), in his pharmacy. She operates a 150-watt transmitter on all bands at home, keeps a 522 transmitter hot on 2 meters, operates mobile on 10 meters and experiments with 2-meter teletype transmission. Since all this doesn't occupy *quite* all of her waking time, Barbara likes to find recreation in such hobbies as bowling, knitting, and horse racing.

"Toast With Jam" received her introduction to radio by way of the Army's high speed course of instruction. She was with G–2 for two and one-half years during the war.

For her home station Barbara uses the transmitter portion of a 522. She has a broad-band converter in front of a Super Pro receiver, and for antennas she has used ground plane, a 5-element beam, and a J.

Before they bought their own home, Barbara and her OM must have set some kind of record for perseverance in keeping their rig on the air. The apartment house owner did not permit antenna installations, but the Lakeys "outfoxed" him. After dark, the two hams would gather up the feedline of the particular antenna they wished to use that night. They would ring for the elevator and, if it were empty, would ride up to the roof, four floors above their apartment. They would then set up the antenna, drop the feed over the side and return to their apartment. Just before daylight, or whenever they were through hamming, the couple had to ascend to the roof again to take down the antenna.

This is enthusiasm of the kind that has made amateur radio grow and prosper. It is this kind of spirit that will help the Military Amateur Radio System develop into a great public service organization. A2TWJ, MARS salutes you. We welcome you to the organization and hope you are just the first of many YL's who will flock to join the MARS.



A2TWJ IS LOCATED AT KEW GARDENS, NEW YORK.

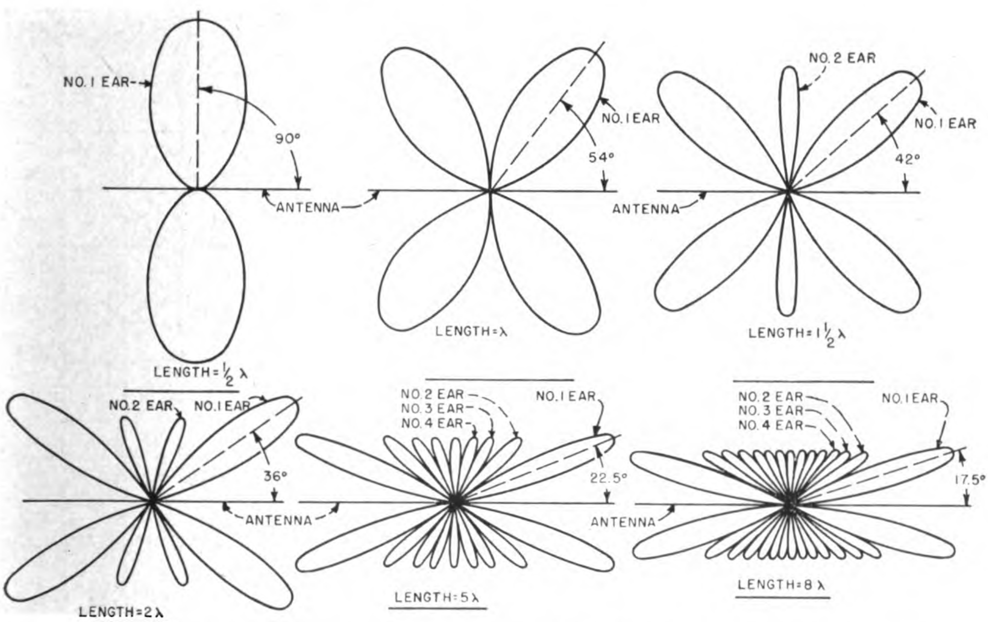
INTRODUCTION TO ANTENNAS

By Alton Hart, Radio Engineer, WAR, W3AX

This is the second article of a series on antennas written for MARS by Mr. Alton Hart, Signal Corps Engineer. The series, written for the radio amateur newcomer, is also a ready reference for the old timer. (Parts I and II, MARS Bulletin, Vol. 1, dealt with directivity and propagation of radio waves.)

III. THE LONG WIRE ANTENNA

Pronounced directivity may be obtained by use of long-wire antennas, that is, antennas which are physically a wave length or more long. In such antennas the radiation tends to concentrate more off the ends as the length (in terms of wave lengths) is increased. Such an antenna radiates more power in its favored direction than a half-wave antenna. A number of patterns are shown in figure 1. In other words, the power gain of a long-wire antenna

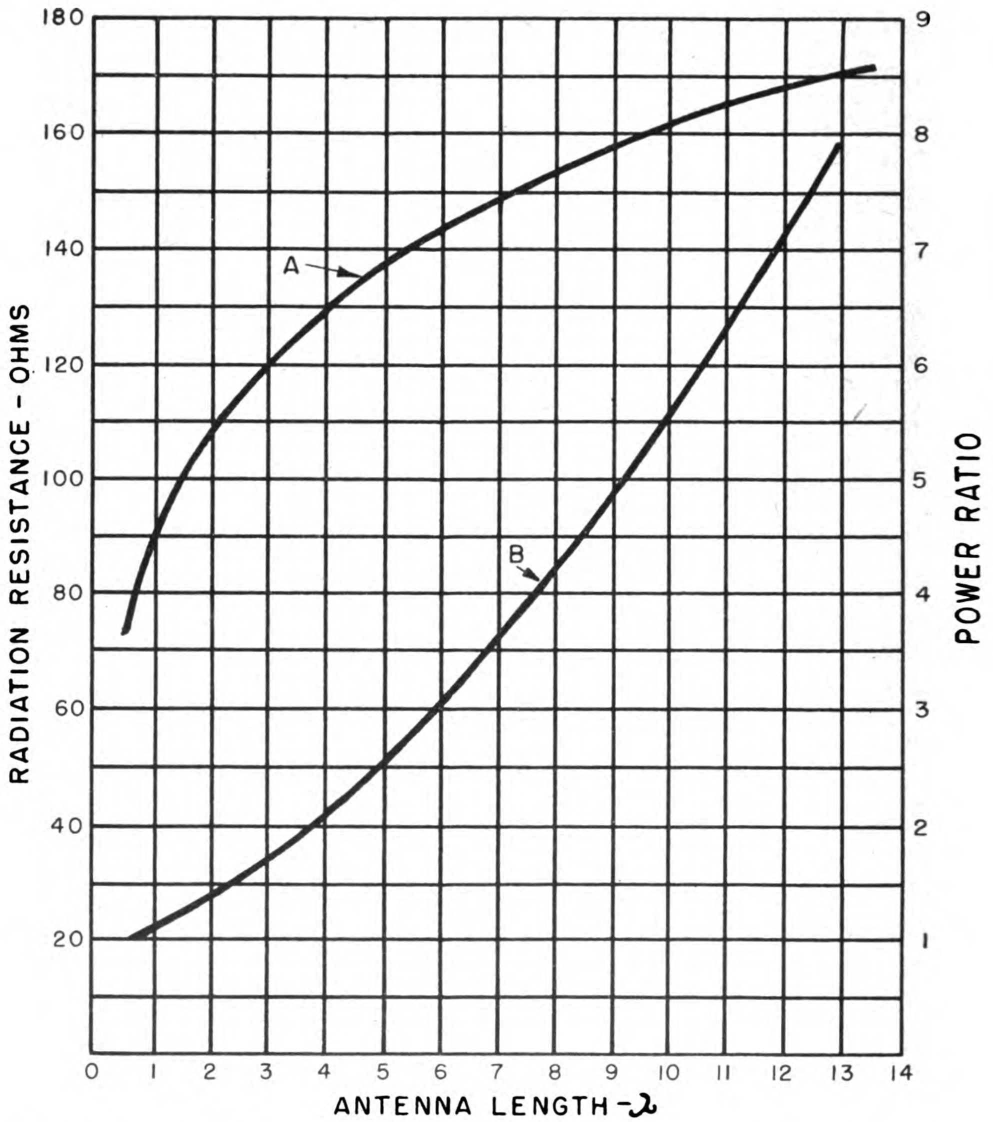


POLAR DIAGRAMS SHOWING STRENGTH OF FIELD RADIATED IN VARIOUS DIRECTIONS FROM ANTENNA CONSISTING OF A WIRE REMOTE FROM THE GROUND.

FIGURE 1.

increases with the length of the wire and, at the same time, the angle of the main lobes decreases with respect to the wire. Also, as the length of wire is increased, minor lobes present increase in number, the total free space number being equal to the number of half waves of wire. This, of course, is the total of both major and minor lobes. Note particularly how the wave angle decreases as the length in terms

of wave length increases. To sum up, the lobes (signifying the shape of the beam of fire) become sharper and the angle of radiation becomes smaller with respect to the wire. This is caused by the vector addition of waves from different sections of the long wire antenna, and reinforcement or cancelation occurs as the wave progresses along the entire length. Remember that a current antinode appears but once in a half-wave antenna; thus, in a wire one wave length long antinodes appear twice, and in still longer wires antinodes increase proportionately. The resistance of long wires combined with other factors, some



THE VARIATION IN RADIATION RESISTANCE AND POWER IN THE MAJOR LOBE OF LONG-WIRE ANTENNAS. CURVE A SHOWS THE CHANGE IN RADIATION RESISTANCE WITH ANTENNA LENGTH, WHILE CURVE B SHOWS THE POWER IN THE LOBES OF MAXIMUM RADIATION FOR LONG-WIRE ANTENNAS AS A RATIO TO THE MAXIMUM OF A HALF-WAVE ANTENNA.

FIGURE 2.

previously mentioned, causes the radiation from each section to be modified. This, in turn, modifies the resultant obtained as vector addition occurs along the entire length. To state this another way, the reason that long wire directional characteristics differ from those of a simple antenna is the currents in the various sections are not in phase and, further, the distances from a remote point to the various sections of the antenna are not equal. The result is that the radiated fields (from different sections of the long wire) add vectorially. The resultant depends upon the direction and distribution of the current in the wire. The directivity, in practice, differs from the free space directivity pattern. Since both vertical and horizontal polarizations are present, the calculation of a pattern is difficult. Maximum vertical polarization appears directly off the ends, while maximum horizontal polarization appears broadside. Intermediate angles contain both vertical and horizontal polarization.

Figure 2 includes two curves which are a source of long established and well known information. One (figure 2, curve *A*) illustrates the variation of radiation resistance with respect to antenna length, and the other (figure 2, curve *B*) illustrates the relationship between power obtained in the lobes of maximum radiation for long wire antennas and the maximum of a half-wave antenna. Thus, radiation resistance and power gain of the major lobe increase as the length of the antenna increases.

The length of a long wire antenna is determined by the formula:

$$\text{length in feet equals } \frac{492\ (N-0.05)}{\text{Frequency (in mc)}}$$

N represents the number of half waves on the antenna. Note that the length cannot be determined by simply multiplying the length of a

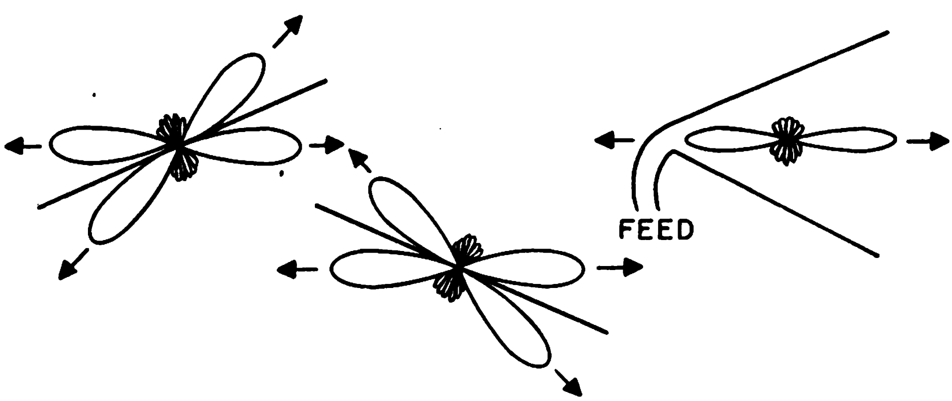


FIGURE 3. TWO LONG WIRES AND THEIR RESPECTIVE PATTERNS ARE SHOWN IN THE DIAGRAM. IF THESE TWO WIRES ARE COMBINED TO FORM A V, THE ANGLE OF WHICH IS TWICE THAT OF THE MAJOR LOBES OF THE WIRES, AND THE WIRES ARE EXCITED OUT-OF-PHASE, THE RADIATION ALONG THE BISECTOR OF THE V ADDS AND THE RADIATION IN THE OTHER DIRECTION TENDS TO CANCEL.

FIGURE 3.

single half-wave antenna by an integer because a half-wave antenna in space is approximately 5 percent shorter than mathematical computation indicates, due to the end effect of the wire. In long-wire antennas the end effect operates only on the end sections; therefore, the wire length approximates that of an antenna erected in space.

IV. THE BASIC HORIZONTAL V ANTENNA

We have seen already how the use of a long-wire antenna affects the radiation pattern and the resultant directional qualities of transmission and reception. It is possible to increase the directional characteristics of an antenna system (as well as to increase the gain) still further by combining the effects of two or more long wires. The basic V antenna, which operates on this principle, is shown (fig. 3) and consists of two long resonant wires strung out in the form of a letter V. It is erected so that equal currents in phase opposition appear in both legs. The best directivity and gain is, of course, obtained when the apex angle is optimum. As to the lobes, each leg produces its own at an angle from the wire, forming the leg as shown (fig. 3), and both patterns are then combined to form a third one which represents the pattern radiated by the assembly as a whole. The resultant pattern shows pronounced directional effects in the plane of the V, and this directivity is emphasized still further as the legs are made longer. Proper selection of the apex angle (called the "included angle") concentrates radiation in the direction of the angle's bisector. All factors we have discussed, so far, affect the directional and gain qualities of the V.

The V-type antenna is bi-directional along the bisector of the included angle but can be made uni-directional by use of a reflector antenna, of similar construction, placed alongside, above, or behind the radiator. The reflector generally is placed an odd quarter wave length away from the radiator and excited 90 degrees out of phase; this, of course, can be varied in both spacing and phase relationship. You also can obtain a uni-directional effect by terminating the open ends of the V to ground through a suitable resistor dissipation line. As will be shown later in the case of the inclined V, the legs of the V can be made extremely long, causing part of the legs as they approach the surface of the ground (called the "trailing ends") to act as the termination device. This latter method has given excellent results in practice. Use of the non-inductive resistor, or dissipation line, is not generally recommended because it is difficult to obtain the proper match of impedances using the type of construction available to most amateurs.

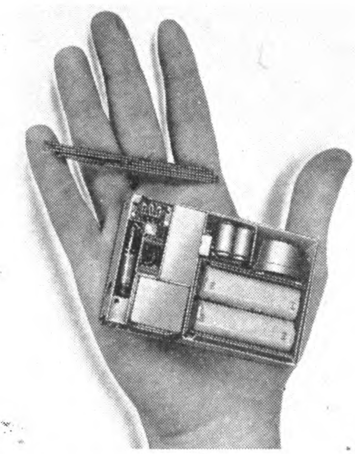
The use of some form of termination also allows the V to serve as a nonresonant antenna making possible operation on a number of frequencies (rather than only one, as is the case in resonant devices) for

highest efficiency. This makes for economy and ease of operation. The termination device eliminates standing waves; the current in the wire, therefore, decreases uniformly as the termination is approached. Loss of energy by radiation and by the wire's resistance causes this decrease and the energy remaining at the end is dissipated in the termination device. The energy, which in the case of a resonant wire would be returned along the wire and radiated in the backward direction, this disappears. It is this action that produces the unidirectional character of the antenna.

A better picture of the characteristics of the horizontal V will be found in charts in any radio engineering text or handbook. These charts will show the relationship between the included angle and the length of the legs, as well as the effect on the angle of radiation (wave angle).

In the next article I'll take up the inclined V antenna with its angles of radiation, the effects of tilting the V, its trailing ends, height above ground, the round trip attenuation necessary in the trailing ends and, if space allows, the included angle and its measurement.

George Colman.



Miniature Transceiver.

SIGNAL CORPS DEVELOPS MINIATURE RADIO SET

The Mars Bulletin will carry, from time to time, articles, reprints or condensations of timely and interesting developments in the fields of electronics and communications.

A radio receiver and transmitter so small that it fits into a king-sized cigarette package has recently been developed by the Signal Corps. The set was shown first last spring before the Institute of Radio Engineers when that group met in New York. The development was heralded at that time as an example of what actually can be accomplished in the way of miniaturization.

The trend in electronics and communications equipment is more and more toward miniaturization, and the laboratory engineers of the

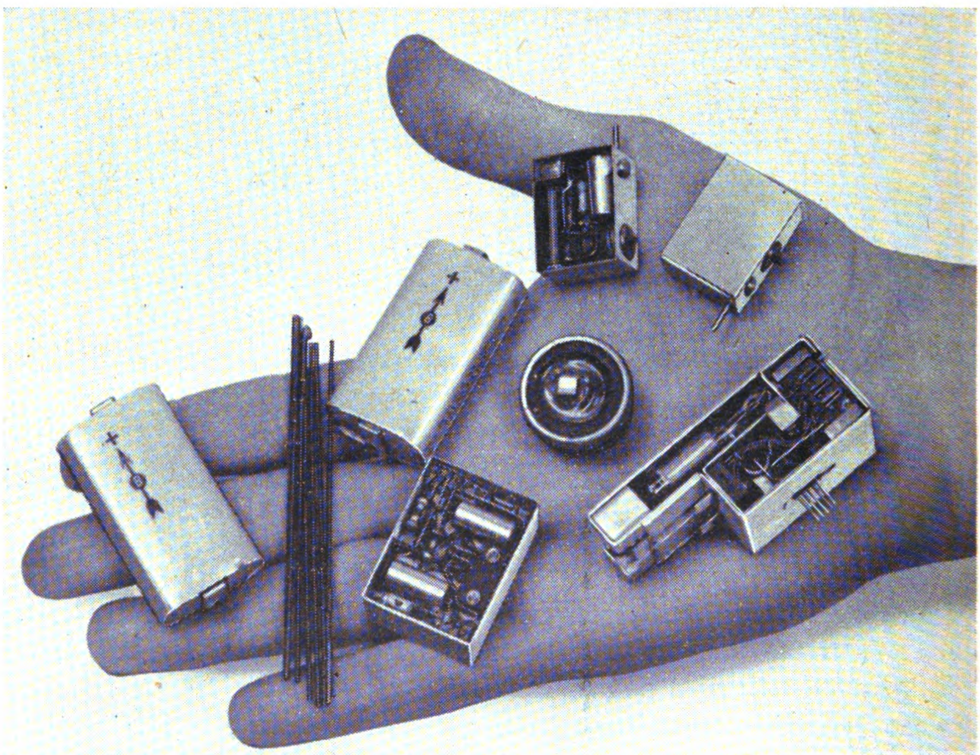
Signal Corps were told to come up with a "shirt-pocket" radio set. They did—and how!

The tiny transceiver, weighing only 11 ounces, which will transmit and receive spoken messages over distances greater than 200 yards, is believed to be the only radio of its size in the world that contains, in one package, all the necessary component parts including the power supply.

The set is designed to operate in the frequency range around 50 megacycles.

In contrast with other sets of comparable size that receive only, and use batteries weighing several pounds carried separately, the Signal Corps miniature transceiver has two B batteries, one A battery, a two-foot, collapsible whip antenna that folds into the case of the set, four sub-miniature tubes, plus the usual internal radio components, all contained in a tiny metal case that is only 1 inch thick, 2¼ inches across the base, and 3½ inches high.

This remarkably small set was designed by George E. Colman, Red Bank, New Jersey, an engineer employed by the Signal Corps Engineering Laboratory. It has a built-in speaker and microphone; the lid of the radio case opens slightly to become the bell of the speaker



THE CIGARETTE SIZE RADIO SET USES PLUG-IN UNITS TO SIMPLIFY MAINTENANCE PROBLEMS.

and the opening through which the voice messages reach the microphone.

Despite its extremely small size the new set employs all the latest construction features, such as plug-in units that are merely pulled out and discarded in the event of failure of any of the component parts. Repair of the set thus becomes almost as simple as replacing a blown out fuse in ordinary house electrical systems.

Even the batteries (their life span is approximately 14 hours) are of the snap-in variety that require no wiring when changed. Although the Signal Corps stoutly maintains that the new transceiver is just an experimental model, it is admitted as an excellent example of miniaturization techniques which are a primary goal of Signal Corps development. It opens the horizon of military communications to the possibilities of equipping entire platoons or companies with individual radio sets, for parachute or beachhead work where individual control of men is all important.

The "Handie-Talkie", a Signal Corps radio made famous during World War II, is the nearest thing that the Signal Corps now has to the new invention so far as size and weight are concerned.

The "Handie-Talkie", used by thousands of troops in the field and on the beachheads all over the world, weighs 6 pounds, is over 1 foot in length, 4¼ inches deep and 3½ inches wide.

Even though the Signal Corps experimental set uses parts so tiny that jewelry tools were used in its construction, it still lends itself to tropicalization (moisture and fungi proofing) found so necessary for the proper operation of all electronic devices in the heat and humidity of jungles. When sealed, it makes possible the landing of equipment by floating through the surf without impairing its operating efficiency.

MARS QSO WINNERS

MARS Chiefs have announced the six Army/Air Force area winners in the Military Amateur Radio System QSO Party held 3 and 4 December 1949. Winners and their scores are: First Army/First Air Force Area—Joseph Meyers, A1RGB; score—128. Second Army/9th Air Force Area—Griffin Davis, A4NGX; score—928. Third Army/14th Air Force Area—Robert Preddy, A4EDA; score—504. Fourth Army/12th Air Force Area—Merwin Forbes, A5NRK; score—288. Fifth Army/10th Air Force Area—Arthur O'Neil, A9PDS; score—833. Sixth Army Area/4th Air Force—Richard Hulse, A7RFE; score—336. The next MARS contest will be the Joint MARS-Navy Armed Forces Day QSO and Message Relay Contest on Armed Forces Day, 20 May 1950.

MARS STATION AFLOAT

The salt water branch of MARS—Army is located aboard the U. S. cableship, Army mine planter *Ellery W. Niles*. The ship is engaged in harbor defense work on the West coast.

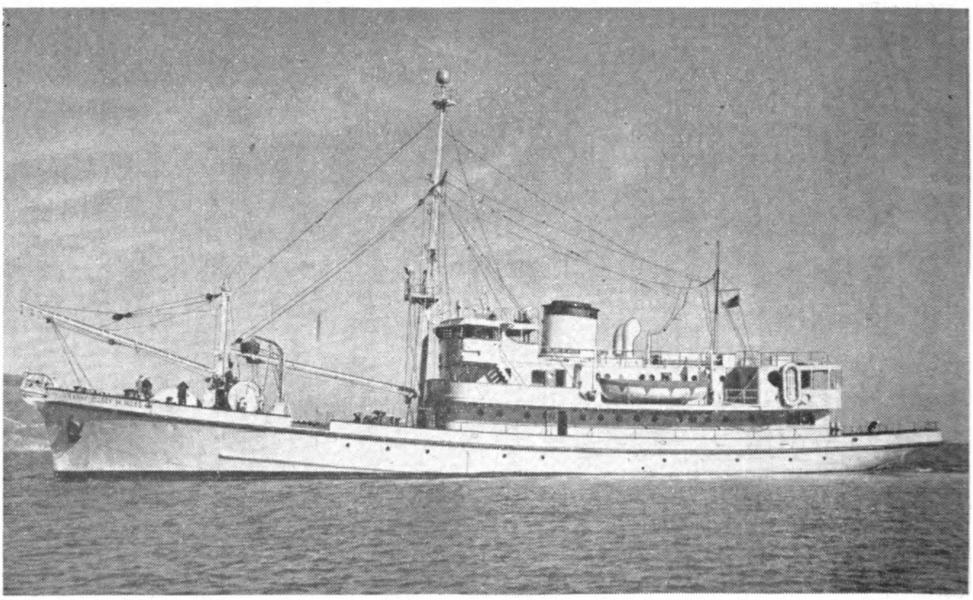
WOJG Louis M. Sieber (A6GRP) and Sergeant First Class LeRoy Hankins (A6WFZ), Martins Afloat, do most of their hamming on 40 meters but are now building a 10-meter rig and expect to have it on the air soon.

Sieber and Hankins are doing a proselyting job also. First Mate WOJG George A. Houghton is beginning to get the bug, the two amateurs say. They predict that his name will appear in the call book soon.

Another who is beginning to get that gleam in his eye is WOJG Burton R. Adams, assistant engineer. The boys say Burt has already picked out a spare room of his Cloverdale, Calif., ranch house to be his future ham shack.

Equipment on the NILES consists of two RCA transmitters and a Collins TCS–1. The 8010 is used exclusively for ship's work, the TCS–1 for MARS. Receivers are an RCA AR8510 and an SX 28.

WOJG Sieber, who just got his call sign last July, is biding his time until he can take his class A exam and move in to help crowd up the 20 meter band.



THE U. S. CABLESHIP—ARMY MINE PLANTER, ELLERY W. NILES.

PRINTED CIRCUITS

Study of the application of the printed circuit art to Signal Corps communications equipment has been undertaken by the Signal Corps Engineering Laboratories. This study indicates the advisability of using separately fabricated components assembled to a printed circuit pattern by automatic means. The Signal Corps Engineering Laboratories are perfecting mass solder-dipping as one of the simplest and most satisfactory methods of component pattern assembly.

Another method for printing circuits which is used commercially and which could be adapted to military communications equipment is that of using hot sprayed metals through a stencil for printing the circuits.

EXTENDING RADIO CIRCUITS TO WIRE LINE FACILITIES FOR EMERGENCY COMMUNICATIONS

Lt. Col. David Talley, ORC–A2PF/W2PF, International Telephone & Telegraph Corp.

The average amateur radio operator is disaster-communications conscious, and he usually possesses some items of equipment suitable for emergency communication purposes. These may include small portable or transportable radio gear, gasoline-driven power units, battery-powered, low power VHF equipment or even a mobile radio station installed in his car for operation on one or more of the several amateur bands (3.5, 7, 14, 28, or 144 mc.). The value of such apparatus in past emergencies has been proven many times, QST and the nation's newspapers will substantiate this statement.

The Military Amateur Radio System, the Naval Communication Reserve and the ARRL Emergency Corps work constantly to improve the organization and training of radio amateurs in order to prepare them for communication service in times of emergency. Disasters such as hurricanes, floods, forest fires, sleet and snow storms, tornadoes, or other "natural" disorders are likely to occur frequently, disrupting wire or other commercial communication channels. It would appear, therefore, that the standardization of equipment items

and operating procedures or methods among amateurs would be a very desirable undertaking.

NEED FOR RADIO—WIRE LINE CONNECTIONS

It has been noted, in communication emergencies, that there is an increasing need for more direct person-to-person communications between various public officials, police officers, or other responsible individuals. In the past, this intercommunication work ordinarily was handled by the "voice-relay" method. That is, a particular official would give his message, or send it by messenger, to an operator at an amateur radio station in the disaster area. This radio amateur would transmit the message by cw or phone, via amateur radio channels, to another amateur station in the city of the addressee, where it usually would be delivered by telephone. Replies and subsequent communications normally would be handled in a similar manner between these two amateur stations. In many cases, it is essential that officials or other responsible persons concerned with Red Cross disaster activities, power and telephone line maintenance, railroad operations, and other functions, be able to have direct person-to-person conversations with disaster area personnel. In this manner, pertinent matters can be discussed quickly. The individuals also can identify themselves in connection with any requests for materials, police assistance, medical supplies, or other matters required to assist the people in the disaster area.

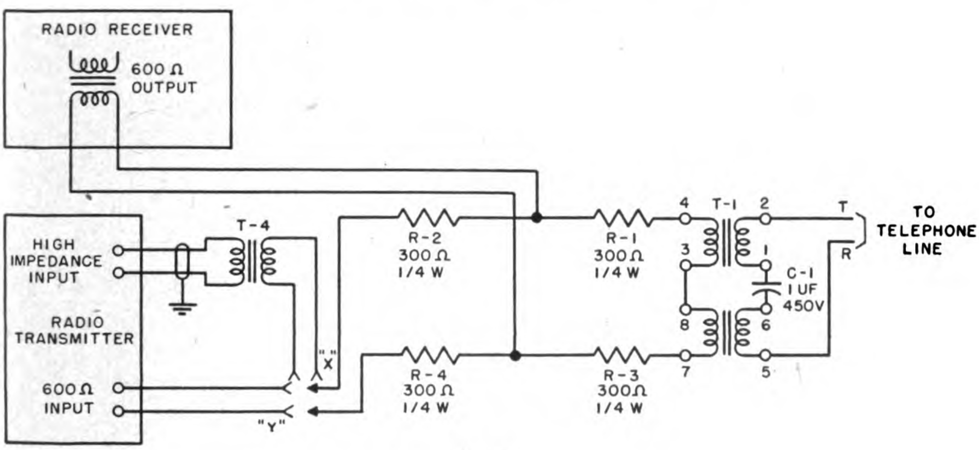
To provide this communication facility may require the temporary interconnecting of wire lines to the radio channels, for the period of the emergency, or until some wire circuits are restored. It should be understood, in this connection, that it is necessary first to obtain permission from the telephone company before attempting any physical connection to telephone lines. The rules and regulations of telephone companies generally prohibit any physical attachments to their lines or instruments without their approval. Because of the increasing use of recording apparatus to record telephone conversations, many telephone companies now lease a line connector and tone warning unit (W. E. #50–A Connector or equivalent device) to be used with the recording equipment. This may or may not be required at the radio station when wire lines are patched to the radio circuit during disasters or other emergencies.

SIMPLEX OPERATION METHOD

The prime purpose of this article is to describe briefly the construction and operation of a simplified four wire radio—two wire telephone termination set (usually abbreviated to "phone patch") for interconnecting a radio circuit to the wire network if so required during emergencies. Elaborate and expensive control terminals are employed

by commercial communication companies for handling oversea telephone calls. It is not necessary or feasible for the amateur to attempt to duplicate the type of operation performed on such long distance radio-telephone circuits. Circuits and apparatus described herein are based on standard commercial practices and design considerations. With proper audio-gain adjustments, the speech levels should conform to wire line transmission requirements, always providing, of course, that there is no QRM.

Radio circuits, in effect, are four-wire circuits; two wires to the transmitter's input and two wires from the radio receiver's output. Radio transmitters and receivers are essentially one-way devices because speech or other intelligence may be sent in only one direction through the equipment. The telephone network operates on a two-wire basis; there are two wires from each subscriber's instrument to the central office. In order that radio may be used as an extension of the wire network, it is necessary to match the four-wire radio network into the two-wire telephone line. This may be accomplished readily if the radio circuit is operated on a push-to-talk, or simplex, basis as is usually the case in amateur radio operations. This simplex operation refers to the fact that the receiver is inoperative when the transmitter is in operation and vice versa. Figure 1 illustrates a suggested method for a telephone line connection for simplex operation. It is desirable for transmission purposes that the radio receiver's output and the radio transmitter's input have terminal impedances of 500/600 ohms in order to match the telephone line.



NOTES:

1. T-1 = 600 OHM OUTPUT REPEATING COILS. W.E. NO. 94-E OR EQUIVALENT THE NUMERICAL DESIGNATIONS REFER TO THE TERMINALS ON THIS TYPE TRANSFORMER, SIGNAL CORPS NO. C-112 OR C-161 COILS CAN BE USED.
2. T-4 = 600 OHM LINE TO GRID TRANSFORMER.
3. USE "Y" WIRING FOR RADIO TRANSMITTERS WITH 600 OHM INPUT, USE "Z" WIRING AND APPARATUS FOR RADIO TRANSMITTERS WITH HIGH IMPEDANCE INPUTS.
4. TO BE USED FOR SIMPLEX OR PUSH-TO-TALK MANUAL SWITCHING.

FIGURE 1.

The 300-ohm resistances, R–1, R–2, R–3 and R–4 (fig. 1) form a dividing network. During reception, the audio output of the radio receiver is approximately equally divided between the input circuit of the radio transmitter and the winding of Repeating Coil T–1. The audio power in the transmitter's input is lost, the radio transmitter being inoperative. This audio loss is unimportant because the average communication receiver has audio output to provide more than enough audio to the telephone line including this 3-db loss.

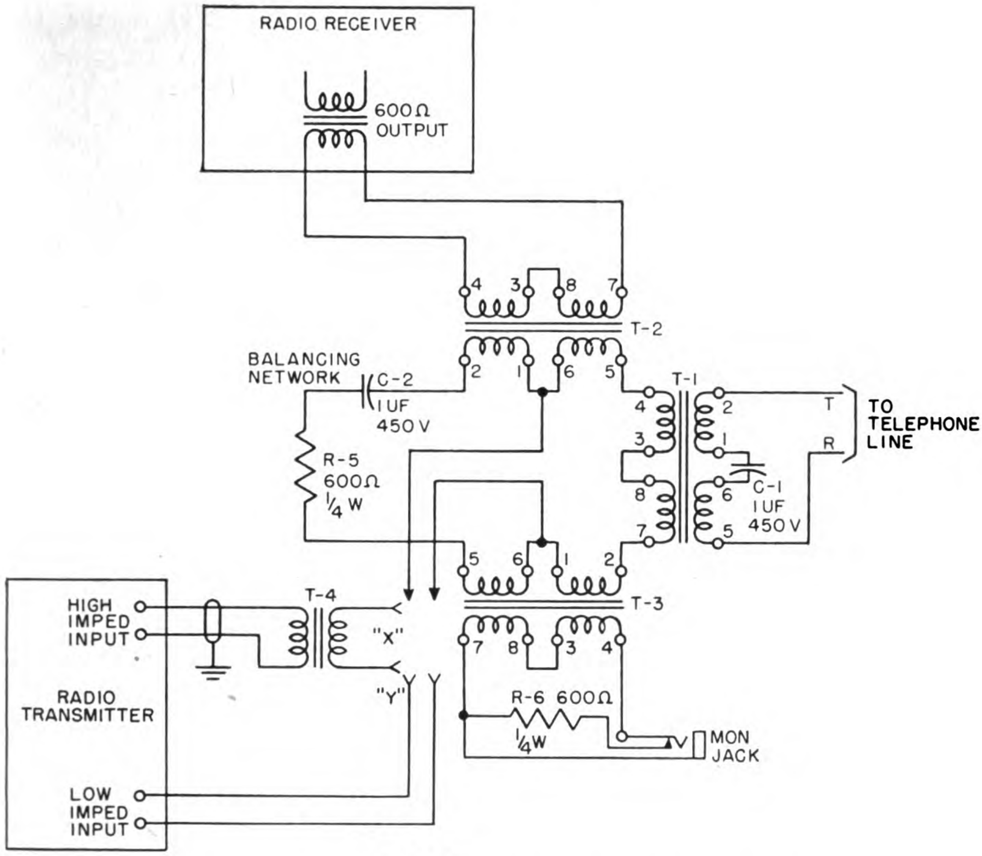
When the transmitter is in operation, the input from the telephone line divides equally between the transmitter's input and the receiver's output circuit. The speech level from the telephone line should be be sufficient to fully modulate the radio transmitter with normal gain adjustments. It may be necessary, however, to "ride the gain" to compensate for varying speech levels from the telephone line during the conversation period.

FULL DUPLEX METHOD

Occasions may arise where the use of full duplex operations would be advantageous. This type of operation requires that the radio transmitter and receiver be connected to the telephone line in such a manner as to permit simultaneous conversations without switching the transmitter on and off. This method may be employed, for example, on the 2 and 11 meter bands where A-ø emissions are authorized. It also can be used for cross-band operations from 2 to 10 meters, 11 to 20, and 75 meters, etc.

While usable results may be obtained by bridging together the transmitter input, receiver output and telephone line termination, the audio gain of the radio circuit must be kept down to very low values. Otherwise, "singing" (feedback) or oscillations will result because of the continuous path existing around the radio circuit loop. To overcome these difficulties, telephone engineering practices prescribe a hybrid circuit (fig. 2). In the ideal case, the balancing network (C–2 R–5) is an exact replica of the impedance presented at the terminals leading into the wire line. Under these conditions, any voltage impressed by the radio receiver's output will leave the points across which the transmitter is bridged, at the same potential. Therefore, no energy is transferred to the radio transmitter's input circuit. Incoming signals from the telephone line, however, will produce a voltage across the input of the radio transmitter. Theoretically, this method permits circuit stability with high audio gains.

For perfect balancing, it would be necessary to provide a special network for the particular telephone line which connects to the radio equipment. It has been found, for all practical purposes, that a



NOTES:

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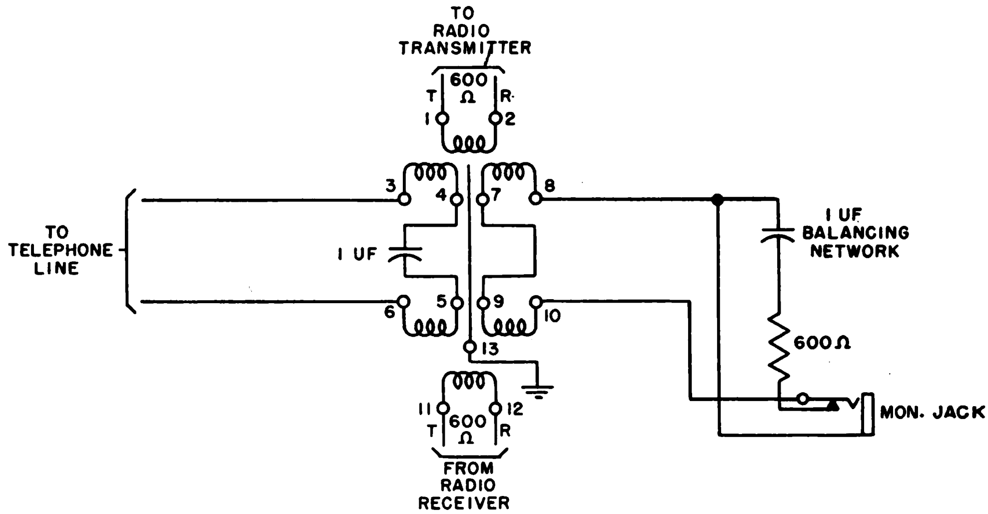
3- USE "Y" WIRING FOR RADIO TRANSMITTERS WITH 600 OHM OUTPUT.
4- USE "X" WIRING AND APPARATUS FOR RADIO TRANSMITTERS WITH HIGH IMPEDANCE INPUTS.
5- TO BE USED FOR FULL DUPLEX OPERATIONS OR FOR INITIAL SIMPLEX OPERATIONS WHERE DUPLEX SWITCHING IS PLANNED FOR FUTURE OPERATIONS.

FIGURE 2.

compromise balance, as per R–5 C–2, (fig. 2) may be utilized to represent the average impedance of the telephone line. Sufficient audio gain values can be obtained with this balancing network which will be acceptable for telephone operations and, at the same time, will maintain a sufficient margin of safety below the "singing" point.

The three transformers or repeating coils, T–1, T–2, and T–3 of figure 2, may be combined into one hybrid coil as shown in figure 3. The over-all dimensions of such a particular hybrid coil, as for example, the type #W–15–127 manufactured by Federal Telephone and Radio Corporation, are only 3½ by 2 by 2 inches. The use of a single transformer of the multi-winding hybrid type makes it possible to assemble the entire four wire—two-wire termination set on a 4 by 8-inch size panel.



NOTE:
TO BE USED FOR FULL DUPLEX OPERATIONS OR FOR INITIAL SIMPLEX OPERATIONS WHERE DUPLEX SWITCHING IS PLANNED FOR FUTURE OPERATIONS.

FIGURE 3.

USE OF MONITORING JACK

The monitoring jack connected across the secondary winding of transformer T–3 (fig. 2) may be utilized for the following purposes:

a. A pair of head-phones may be plugged into this jack to monitor the communication channel.

b. A decibel meter, vacuum-tube voltmeter, or similar device may be inserted to measure the relative audio levels and to check the balance of the hybrid termination. These instruments should be terminated in 600 ohms (if not so designed), in order to obtain accurate measurements.

c. Another telephone circuit can be connected to the monitoring jack for a conference circuit.

AUDIO LEVEL ADJUSTMENTS

Most radiotelephone transmitters used at amateur radio stations are designed for use with high impedance microphones of the crystal, dynamic, or similar types. These microphones have a low-level output, usually in the order of −30 db to −55 db. The speech input from the ordinary telephone line ranges from about 0 db to −20 db. It will be necessary, therefore, to materially reduce the gain of the speech amplifier of the radio transmitter. In this connection, the amplifier gain control should be adjusted for full modulation of the radio transmitter on the incoming speech from the telephone line. This usually requires the operator to "ride the gain" of the transmitter on a connection to the telephone network.

During the reception period, the volume control of the radio receiver should be adjusted to give sufficient audio level to the telephone line, corresponding to average speech conditions. Telephone companies usually require that audio inputs to their lines from amplifying devices should not be greater than about +8 db, based on 12 mw reference, and care should be taken not to exceed this value. Crosstalk may be caused in telephone cables on high audio levels and this condition must be avoided at all times. It is suggested that a decibel meter or VU meter, terminated in 600 ohms, be bridged across the tip and ring of the telephone line to check the audio level from the radio receiver. The volume control of the receiver should be adjusted for optimum operation, exercising care not to exceed the 8-dbm level on average peaks. A vacuum-tube voltmeter or decibel meter also may be connected to the monitoring jack to monitor levels after the initial adjustments have been made and the reference values established.

The repeating coils or transformers described above are standard types made by telephone manufacturing companies. It is possible to utilize Army surplus types in place of transformers T–1, T–2 and T–3 (figs. 1 and 2). The Signal Corps type coil C–161 or repeating coil C–112 may be substituted for T–2 and T–3. In this event, the "switchboard" terminals of coil C–112 are connected to the radio receiver and monitoring jack circuits. The "Line" terminals connect in place of terminals 2 and 5 of transformers T–2 and T–3 (fig. 2). The "Teleg." or "Ground" terminal which is the center-tap of the "Line" winding, connects to the radio transmitter's input as indicated for winding terminals 1 and 6 of T–2 and T–3. If a type C–161 coil is used in place of repeating coil T–1, it is desirable to install a DPST switch to disconnect this coil from the telephone line when not in use. This is because this type of repeating coil has no split windings for the insertion of a 1 MF capacitor for blocking the d-c path across the telephone line. It is not advisable to insert a series blocking capacitor because of the resultant mismatch and distortion introduced in the telephone line circuit.

GHQ FEC MARS IS ACTIVITATED

The Far East Command organization of MARS has run into a problem not faced by any of the Army/Air Force Areas in the zone of interior. That is the problem of too many diverse units scattered over too great a land-sea area and regulated by a Military Occupation Government.

General Headquarters, Far East Command, originally prescribed MARS as a strict "area" organization, as expressed in GHQ FEC Circular No. 42. Recent expressions from FEC MARS members, however, indicate that a system following Army and Air Force command

channels is more suitable. Therefore, a tentative net of six units has been set up—

Far East Command, directed by Major J. D. Flewelling, Sig Sec, GHQ FEC.
Far East Air Force (FEAF), directed by Major P. E. Cool, A–3 Comm, Hq. FEAF.
Eighth Army, directed by Major L. F. Trott, Sig Sec Hq Eighth Army.
Ryukyus Command, directed by Captain G. H. Schmidt, 11th Sig Sv Bn.
13th Air Force, directed by Captain O. Blankenship, 14th Comm Sq.
Itazuke Air Force Base, directed by Captain D. E. Field, 527th AC&W Gp.

Amateur radio operation in the Philippines is confined exclusively to MARS activities, since the Commonwealth has not authorized any ham activity. Several Navy hams in the Philippines have made inquiry about the MARS organization and have expressed a desire to join. Since Naval Reserve Communications have not been extended to the Philippines, and probably will not be so extended in the forseeable future, the MARS chiefs and the command unit directors welcome the applications and the cooperation of qualified Navy radio amateurs.

"ADJUSTING" MARS CRYSTALS

Col. F. E. HANDY, AF1BDI/W1BDI

It is essential that every MARS station operate exactly on the assigned frequency channel. The quartz crystals distributed for frequency control usually will be found to have been manufactured to accurate standards—3497.5 kc., 3498.75 (for 6997.5 kc use), and 3601.25 (for 14405 kc). However, circuit capacity and holder capacity, oscillator element voltages, and the like may cause considerable variation in the control frequency when we apply the quartz crystals, supplied net control stations, to actual transmitter use. Since net member stations not yet equipped with frequency controlling units must, in many cases, ZERO-BEAT to the NCS at the start of drills, it is extremely important for the NCS to check his crystals against standards and to make fine adjustments to prevent interference and avoid complaints from other services that work near our MARS frequencies!

Increasing the capacity of the crystal holder or putting capacity across the crystal will lower its frequency slightly. Conversely, reducing holder capacity, that is, opening up the plate spacing, will raise frequency. Such measures, however, are limited since the effective activity of the crystal will be lessened and its consequent control of the circuit impaired.

THE SILVERING PROCESS

For those who wish to do a superior and permanent job we offer the following references on "Silvering Quartz Crystals to Lower Frequency:"

W4PAL-W4TZ—February 1933, QST, page 48.
W1GMD—March 1934, QST, page 41.
Parsons—March 1932, QST, page 20.

Since all except the 1934 reference are out of print, here's how you can do it—

1. Wash crystal in carbon-tetrachloride to free it from grease and dirt. (Keep in distilled water until ready to silver, or dip in tin chloride to make the silver "take" better.)
2. Local glass companies can furnish silvering solutions mixed to the right proportions. If you wish, you can follow the formula on page 20 of the March 1932, QST, or the one on page 41 of the March 1934, QST.
3. Place the crystal on edge in a glass or ceramic dish, with one edge of the crystal leaning on the wall of the vessel so the solution can contact both sides of the crystal.
4. Pour "Solution One" around the crystal with care. (From the '32 QST, this is one gram of silver nitrate in 150 cc distilled water.) Add dilute solution of ammonia until the brown precipitate is nearly, but not quite, dissolved. Add one-half gram of potassium hydroxide (dissolved in 25 cc of water). The solution will turn dark brown. Add more ammonia until this precipitate is nearly dissolved, then pour. Should too much ammonia be added, the brown color may be restored by adding a little silver nitrate.
5. A reducing solution which has been allowed to stand a week before using (about 15 cc of it) should be added next. "Solution Two" (the reducer) is made by dissolving eight grams of cane sugar in 70 cc of distilled water, then adding 18 cc of ethyl alcohol, and 0.3 cc of concentrated nitric acid which has been dissolved in 15 cc of distilled water.
6. Allow the mixture of the two solutions to stand for a few minutes. The length of time in the solution, the strength and quantity of the solution and the temperature will determine the amount of the deposit. If the temperature is too low to precipitate silver, it will have to be raised. The deposit is not a hard surface but a soft precipitate, so handle it carefully at first. After pouring off the liquid, rinse and dry the crystal.
7. Too much silver can be removed by washing with nitric acid and then resilvering to the desired frequency. The finest abrasive (No. 600 carborundum for polishing) can be used to grind down the dried silver film as another way to readjust frequency toward its initial

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value. The edges may require polishing to prevent contact between the two silvered surfaces.

IMPROVES OSCILLATION CHARACTERISTICS

W4TZ assures us that crystals he silvered oscillated perceptibly easier when silvered than before, controlling about 3 percent more power output. It is recommended that the crystal be returned to the usual type pressure holder for regular use. It is reported that "one coat" on 14-mc crystals gives about 20-kc change. With 3.5 mc "rocks" several successive coats may be required, if the crystal is to be moved plus or minus 5 kilocycles. Just one or two coats and adjustments may be all that is required to put our MARS transmitter "on the nose."

SIMPLIFIED METHOD OF LOWERING CRYSTAL FREQUENCY

W9KNZ contributed (page 64, April 1939, QST) a successful expedient for adjusting crystal frequencies when he tried painting crystal surfaces with iodine and mercurochrome. He reports that either the tincture or the aqueous solution will work. The mercurochrome probably will be more permanent, although the iodine gives the more pronounced effect.

First, clean the crystal well in soap and water, rinsing thoroughly in warm, clean water. Lay the crystal flat on a level surface. Place one drop of either solution in the center of the surface and guide it around over the crystal face until the whole surface is uniformly covered. Let it dry and repeat the process on the other side. The effect can be increased somewhat by repeating the process two or three times. When dry, wipe the crystal with a soft cloth or lens tissue before putting it back in the holder. This will remove any dust or lint that may have adhered to the surface. Usually an 80-meter crystal will be "used" 3 or 4 kilocycles. Instead of impairing the crystals as do most hit-or-miss treatments, such as India ink, this process seems to improve crystal activity up to a point.

W9KNZ "moved" a 7-meg AT-cut crystal some 13 kc by this method; so we suggest that great care be taken to use dilute solutions and apply them sparingly in making the necessary *rather small* adjustments of our 3.5 mc-region crystals to get them precisely on frequency for MARS operations.

Silvering methods are, of course, superior for permanency, but the method just described has proved practical and satisfactory. Where band-edge or near band-edge crystals, just within 3.5 or 7 mc, are available (to points 6 or 8 kc inside the ham bands), the above methods may enable MARS members to adjust them to the MARS spots listed above.

CUT AND TRY

EMERGENCY REPAIRS

Since most radio amateurs do not carry a complete stock of spare parts, and since breakdowns in radio gear will occur, even in the best regulated stations, here are a few ideas to keep in mind when making emergency repairs. (Remember, however, it is always best to replace defective parts in any radio set with identical parts.) When you make an emergency repair be sure you tag the set stating the location, method and date of repair. These emergency repairs are not meant to give more than a stopgap service. In some circuits they might not work. Generally, however, they will work under the conditions indicated.

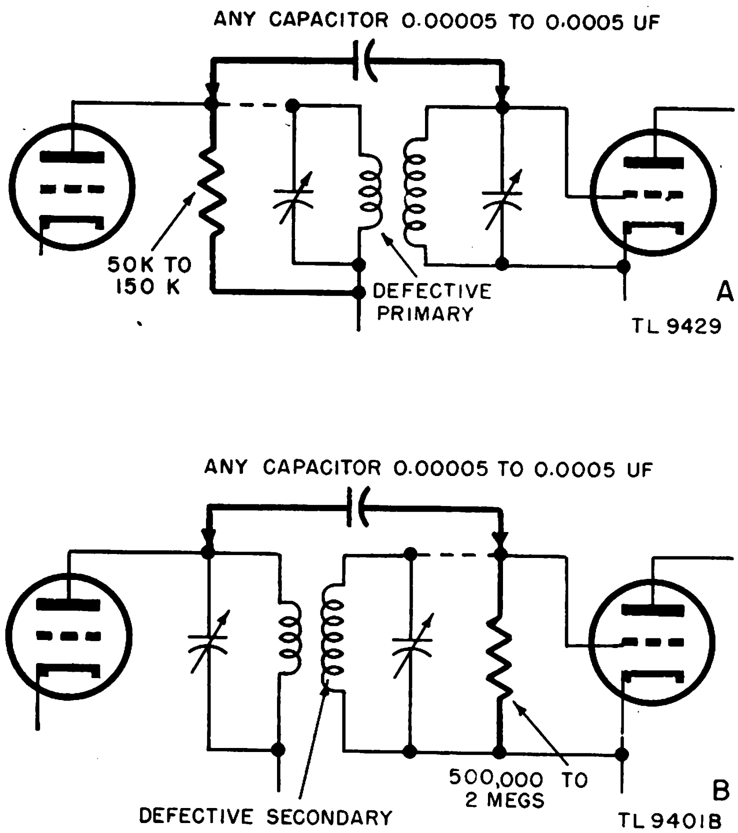

FIGURE 1. Method of substituting a resistor and capacitor for open winding.

FIXED AND VARIABLE RESISTORS

Overheating will decrease the resistance of a carbon resistor. If you run into this problem, try scraping part of the carbon from the body until the correct value is obtained. Sometimes a wire-wound resistor can be repaired by placing a clamp over the break or by shorting the

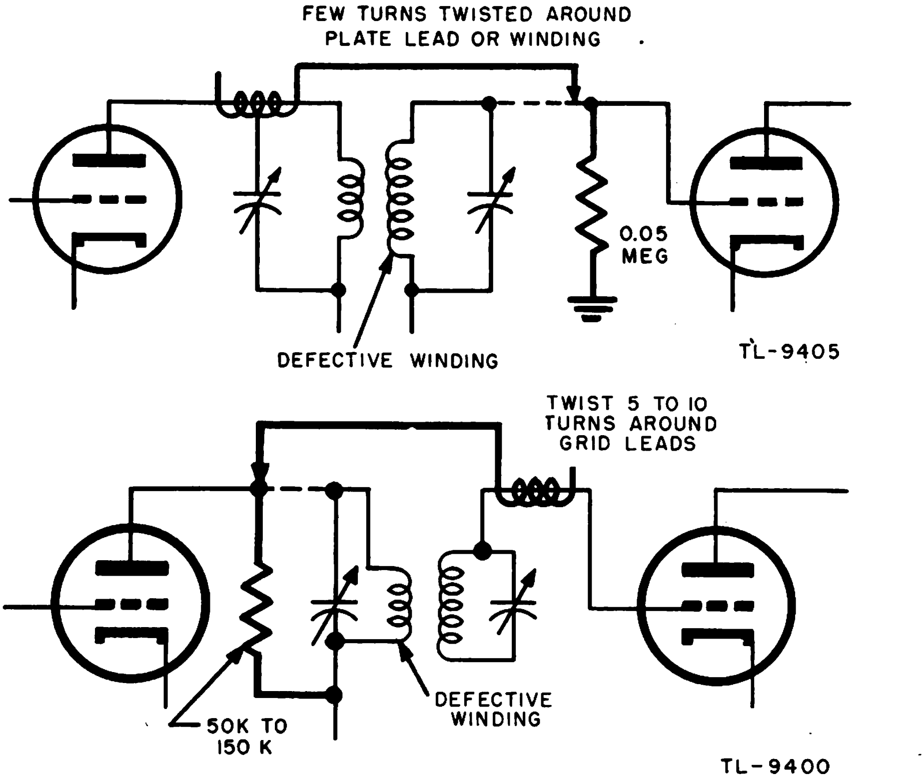

FIGURE 2. Method of substituting a resistor and a few turns of wire for open winding.

break. Continuity is thus restored, although a slight decrease in resistance is noticeable.

Variable resistors and potentiometers, as used in volume controls, seldom burn out because of the small amount of current that passes through them. You'll probably find that faulty operation is caused by poor contact, wear, and dirt at the rubbing contact. Clean with carbon tetrachloride or equivalent. Polish with an ordinary eraser, one which is not too gritty, and adjust the tension of the arm so that it makes a firm contact. A fixed resistor may be substituted if the variable resistor is too worn to make a temporary repair. The value of such a fixed resistor must be found by experiment. If the variable resistor is wire-wound and there is a break in the winding, a small metal tab slipped under the broken section usually will restore continuity.

Burned-out primaries and open secondaries of transformers can be repaired by using an r-f choke or a resistor in place of the open winding and by connecting a coupling capacitor from primary to secondary. If you don't have a capacitor available, wind a few turns of wire around the high r-f lead and then connect it to grid or plate (depending on which winding is open). A resistor for the primary may be from 50,000 to 150,000 ohms; for the secondary, from 0.5 to 2 megohms.

The capacitor may be from 0.000025 to 0.00005 mf for radio frequency and from 0.01 to 0.1 mf for audio frequency.

Sometimes you can isolate a defect to a particular stage in the set and there you're stopped. Repair or replacement is not possible. In such cases you can bridge the stage by connecting a capacitor from the plate of the stage preceding the defective stage to the grid of the stage following the defective stage. *This will not work for detector stages.* You should use a 0.0005-mf capacitor for r-f stages, and a 0.01-mf capacitor for a-f stages. (Adapted from TM 11–4000, "Trouble Shooting and Repair of Radio Equipment", by Chief, Mars—Army.)

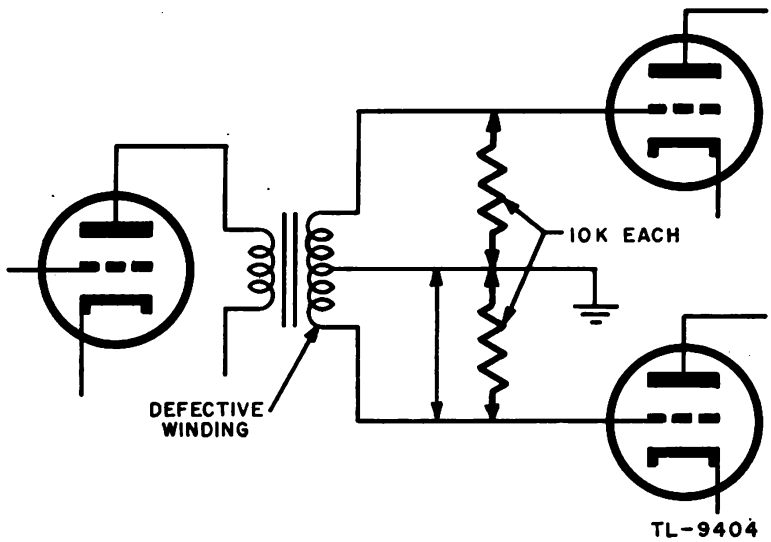

Figure 3. Substitution of resistors for transformer winding.

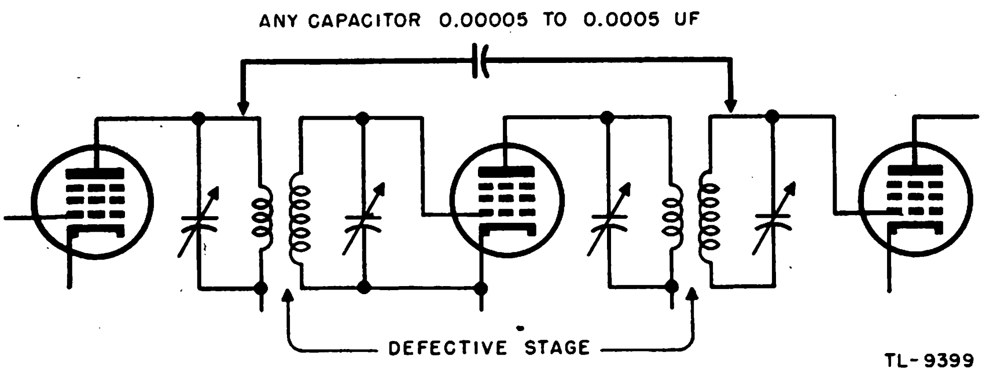

Figure 4. Method of bridging defective stage.

STAND-OFF INSULATORS FOR THE LIGHT ROTARY BEAM

After looking over surplus electronics gear, the jaded radio amateur with his Collins station, panoramic adapters, etc., usually curls his lip disdainfully and says, "So what?"

True enough, most surplus electronics materials are highly specialized items designed for specific purposes; conversion to other uses is often impracticable, or at best, is difficult to effect, and is costly in terms of man-hours and money. Of course, that's the chief reason that surplus electronics materials *are* surplus!

I don't propose to solve this dilemma to the extent of proving that all such scrap is useful to communicators. (I still haven't figured out what to do with the little parachutes that come with the Gibson Girls—except to fasten one on Junior and remove that source of QRM while he struts before the neighbors' children.) But I do want to point out one item that is interesting, useful, and often overlooked.

Antenna changeover switches, such as the SW–225 (and its brothers) have beautiful stand-off insulators for light rotary beams. (I use them on a 10-meter lazy H and reflector, and that *isn't* so light.) These insulators are highly glazed, 1 by 1 by 2½ inches and are tapped for two screws, top and bottom. The SW–225 has nine of 'em; others in the series vary, of course, with the number of poles and throws.

Dismounting the insulators is no chore at all. The screws holding the blade mounts and the female contacts are soldered to their mounting plates. A small blow torch is ideal for releasing them, but if you don't have a blow torch, a soldering iron will do the job nicely; the screw turns easily when heated. Each mount has one headless screw which must have the nut released before the insulator can be rotated freely.

Switch contacts should be unfastened before removing the insulators from the bakelite base plate on which they are mounted. Remember to use felt washers wherever the insulators come in contact with metal when you put them in use on your beam.

MAJ. CHARLES E. SPITZ, W7JHS/5
Radar Department
Keesler Air Force Base, Miss.

AIR FORCE SURPLUS NOTES

Now that a considerable quantity of MARS Air Force surplus has been distributed you will note that many of the items, although they are of little value in their present condition, may be easily adapted for use in your station rigs.

D-C MOTORS—The majority of these motors and blowers were designed to operate on 28 volts dc and it is a fairly simple matter to convert these motors to operate on a slightly higher value of ac volt-

age provided that the field core is laminated and the field winding is connected in series with the armature. You will find that the majority of these motors already have laminated field cores and are series wound or connected. However, examine the motor to make sure. A little experimenting may be necessary to find the proper voltage to operate these motors efficiently, but it should be well worth the effort. A small blower, mounted so that it cools the under side of a chassis with the air escaping around your tubes, will be well worth your effort, even figuring the cost of a transformer to operate it.

TRANSFORMER T–104 55547—This little transformer, of which quite a number were discovered at Warner-Robbins AFB, is a modulation transformer out of an ARC/3VHF transmitter and is ideal for that mobile or midget rig. The ratings are as follows: PRI Z 8450 SEC Z 4000 turns ratio ½ PRI to SEC 0.665 to 1, 20 watts. Frequency range 300–4000 CPS, designed to use a pair of 6L6's modulating an 832B. These should work fairly well with any of the commonly used tetrodes modulating another tetrode such as 6V6's to 807 or 6AQ5's to 2E26.

METERS—A large number of small milliamp meters were found in surplus stocks, and most of them are basic movements of 1 ma and 1.5 ma. Some of them read on the face 150 V. DC, 500 V. DC 1000 V. DC and 2000 V. DC. These do not have either shunts or multipliers included with them and should not be used at their face reading. The majority have an internal resistance of 27 or 26 ohms and are 1,000 ohms per volt. It is extremely simple to construct shunts or multipliers for them using the formulas given in any of the current handbooks.

T/sgt. Harry S. Simms, AF4HBT/W4HBT.

THOUSANDTH MARS-ARMY MEMBER IS NAVY PILOT

Capt. William V. Davis, Jr., USN, Director of Flight Test at the Naval Air Test Center, Patuxent River, Maryland, became Mars-Army member number 1,000.

Davis, who currently operates 40 and 10 meters, is on the air with an ART–13, power input 140–160 watts, both Able One and Able Three emission. His receiver lineup is three ARC–5's in cascade, and he uses a cubicle quad for 10-meter radiation and an off-center fed on 40.

He was the 1949 winner of the National Air Council Award for Naval Aviation Experimentation and Research. The award was made at the Pentagon Building, Washington, D. C., by Secretary of Defense, the Honorable Louis A. Johnson, in September, 1949.

A native of Savannah, Georgia, and graduate of the Naval Academy,

CAPT. WILLIAM V. DAVIS, USN.

class of '24, Davis has been a ham for 32 years and started aircraft radio operating in 1924.

He is holder of the DFC, Legion of Merit, Pacific (5 stars), Atlantic Victory and American Defense military awards.

He participated in the Dole Air Races in 1927 and became the first

Naval officer to reach the Hawaiian Islands from the mainland by air. During the late war he served with the Staff, Commander Aircraft, Central Pacific Force; was Deputy Chief of Staff for Operations, Commander Shore-Based Air Force Forward Area, Central Pacific; and in 1945 was Chief of Staff, Headquarters Strategic Air Force, Pacific Ocean Areas.

CAPT. GUS H. GRISARD makes the introduction at Fort Shafter for Maj. Gen. Spencer B. Akin, OCSig O, who spoke from Washington, D. C., via MARS circuits to Hawaiian Signal officers as part of a Troop I & E Program.

MARS PROVES WORTH AS BACK-UP SYSTEM

The effective worth of the Military Amateur Radio System as a back-up for established military communications systems was ably demonstrated on Wednesday, 19 October 1949, in the Signal Corps Theater at Fort Shafter, T. H. Skeptics (if there were any) received ample proof that the MARS is capable of pinch-hitting for the established military networks should the need arise.

The demonstration was set up as part of a Troop I & E program at Fort Shafter. Approximately 60 Signal Corps officers in the USARPAC

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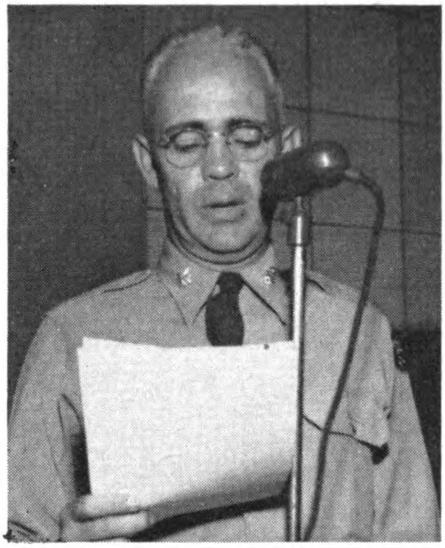
command gathered for the weekly "Officers Call" conducted on that day by Captain Gus Grisard, Hawaiian Signal Operations Group. The subject for the day was "The Army Command and Administrative Network," better known as the ACAN. The highlight of the program was a speech by Major General S. B. Akin, Chief Signal Officer, U. S. Army, broadcast "live" from his office in the Pentagon Building Washington D. C., over WAR/K4USA and relayed by the Fort



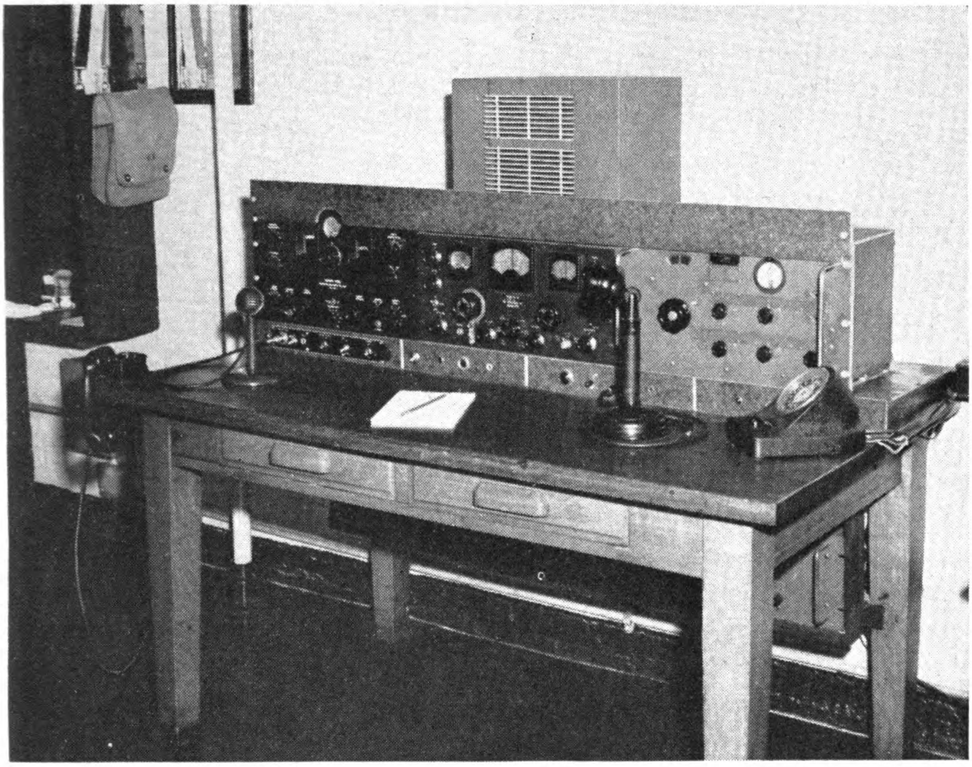
Lt. Col. James Corr, Jr., Commanding Officer, Hawaiian Signal Operations Group.

Shafter Mars station, AB6USA, to a speaker system in the Fort Shafter theatre.

The two-way QSO lasted for an hour and concluded with an unclassified, signal communications open forum between the assembled officers in Honolulu and representatives of the OCSigO in Washington.

Other scheduled speakers on the program included: Lt. Col. James Corr, Jr., Commanding Officer, Hawaiian Signal Operations Group, who expressed his appreciation, on behalf of the USARPAC Officers, to General Akin for his speech; Captain E. L. Nielsen, Chief, Mars-Army, who outlined the aims, ideals and current projects of the Mars; and Mr. T. A. Riviere, Assistant Chief, Methods and Procedure Branch, Army Command and Administrative Communications Agency, who discussed methods and procedures of the ACAN.

A SWING 'ROUND THE CIRCUIT



A1USA at Boston Army Base is a truly shipshape ham shack. Credit for the excellent job goes to Lieut. Harold A. Knapp, Jr., A1L0I, who was on active duty at BAB all summer.

FIRST ARMY

The Military Amateur Radio System in the First Army Area has been reorganized on the county basis. This means that the MARS members, in times of emergency, can be utilized to work with civilian authorities. Those States which have civilian defense agencies organized for emergency work will be able to augment their radio communications facilities with the established networks of MARS First Army. Additional personnel, equipment, frequencies and know-how will be added to the police, fire, Red Cross and locally authorized industrial communications set-ups already in existence.

MARS First Army realizes that only on the local level are the authorities in a position to know intimately the political subdivisions in the various States, counties, and towns. And the present system of MARS is designed to provide for expansion in these subdivisions as well as to provide for immediate utilization in the event of a local, state or national emergency.

Frequency allocations in the First Army Area are designed to provide nets with a maximum of 10 stations, including the control and the alternated control stations.

The control station will hold, in addition to frequencies common to its particular net, at least one additional frequency to provide communication between the net control station and the State NCS. This will enable various local nets to handle quantity traffic on very low power. All this is in keeping with the MARS Standing Operating Procedure.

SECOND ARMY

By literally canvassing the entire Second Army Area, the MARS officials in that area have more than doubled their membership. The membership figure rose from 165 on 1 August 1949 to 369 on 1 November 1949.

Over the signature of Lt. Lingle (A3RYW/W3RYW), a ham-to-ham invitation to join the MARS was mailed to each radio amateur in the Second Army Area. (The mailing list was taken from the Radio Amateur Call Book Magazine.)

The informal approach and the obvious sincerity of the appeal carried a sales message not found in a coldly worded official statement of policy. Here's the way Lt. Lingle started off his personal greeting—

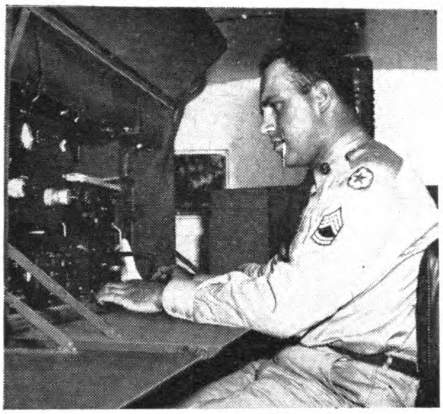
> Dear OM,
>
> As apparent from the envelope this is not a "dodger" from a "radioman's Sears Roebuck;" but it is an endeavor to sell you a bill of goods. From one "ham" to another, please do me the favor of not dropping this parasitic in your ashcan before you read it. Think it over a few days, ask a man who knows, then read it again.
>
> The "bill of goods" that I am trying to peddle is a certificate establishing your membership in the Military Amateur Radio System (MARS).

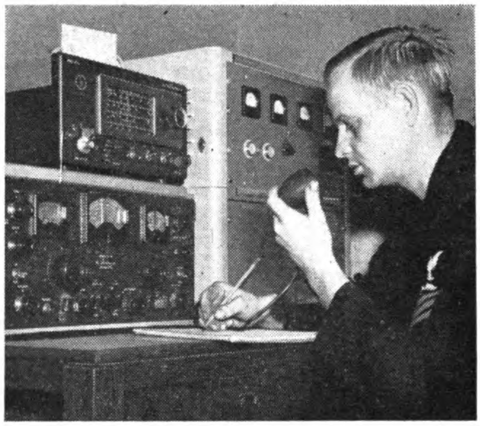
A3RYW then developed the personal approach, pointing out Second Army MARS achievements, setting a goal of "300 members by Christmas," and stating in conclusion—

> Our prime desire is to have all "hams" in Second Army Area as members of Second Army MARS, and to have them operate every sked. In this way each could keep in touch with military radio procedure and each would be better trained to function in an emergency if he should choose to volunteer on such occasion.

With each letter was included an application to join the MARS.

Not all problems are solved in Second Army Area. Operating schedules, equipment issue, and frequency allocation still continue to cause temporary problems that SNAFU the smooth-running machinery until a solution is found. But from a standpoint of getting new members Second Army MARS definitely has shown the way.





Sergeant first class Jack L. Willock, A3NHR, operated an SCR 399 on 40 meters at the Annual Charles County Fair at La Plata, Maryland. He transmitted 96 message and made QSO with every state in the Union from the Fair Grounds.

Joseph E. Drum, A8BYE, on duty at the Naval Air Station, Columbus, Ohio, was MARS member 300 in the Second Army Area membership drive. He gets out on all bands with a Taylor Super Modulated Homebuilt, using a 10-meter beam and an 80-meter folded dipole.

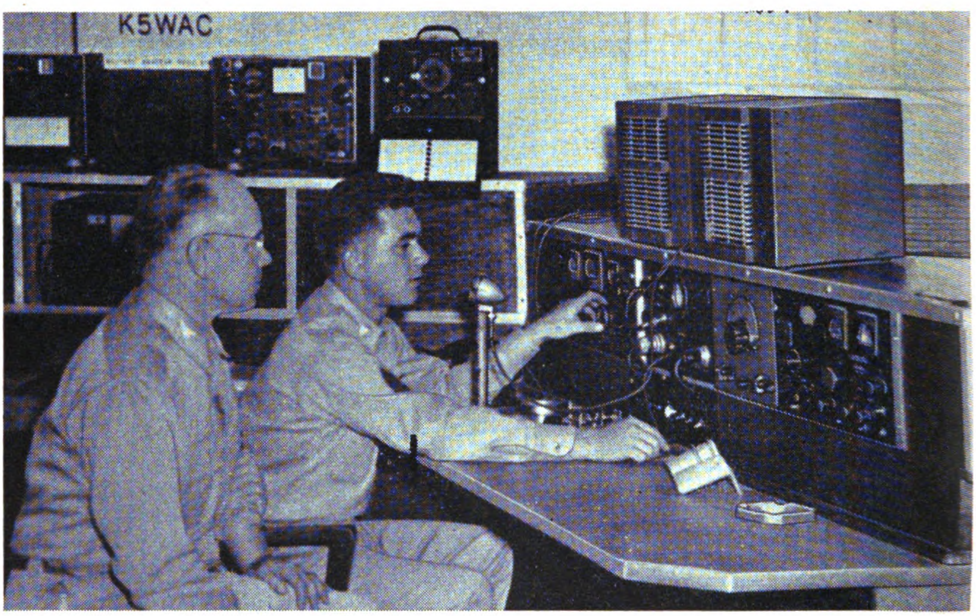
A4WAR, Camp Gordon Radio Club Station is net control station for Georgia MARS and is alternate NCS for the Third Army Net. Private Sturkin is shown at the 2-meter position of A4WAR.

THIRD ARMY

Based upon emergency communications requirements peculiar to the Third Army area, MARS Command Director Captain Charles H. Snead is now reorganizing MARS stations to provide a net headquarters station in each of the seven military districts of the Third Army Area.

Equipment is in operation at the Military District of Georgia Headquarters station. Action has been taken to provide Florida Military District with a MARS station. The other Military District Headquarters are initiating action to establish MARS stations at Birmingham, Alabama; Jackson, Mississippi; Raleigh, North Caroline; Columbia, South Carolina; and Nashville, Tennessee.

Hurricanes and tropical storms create a need for an active emergency and disaster net in the Third Army Area. MARS stations proved their worth in the 1949 hurricane season when members monitored MARS frequencies, passed Red Cross traffic, and worked with the Amateur Emergency Corps' Florida Hurricane Net.



Colonel Peter S. Shunk, MARS Station Director, Fort Bliss, and M/Sgt Ferdinand Wuenschel, A5GAE, NCS for West Texas District, shown at Military Amateur Radio Station A5WAC, Fort Bliss, Tex

FOURTH ARMY

Organizing operable MARS nets in the Fourth Army Area has produced a man-sized headache for MARS Director Lieutenant Jack Thompson. The short-grass country laps over into the bayous of Louisiana. Cactus wastes and mountains are equally prolific in the Army Area. This, together with the sparseness of population in some of the sections makes for networks which embrace too much territory.

The Army Area has been broken into state districts with the NCS in each state assuming responsibility for all intrastate drills. These district stations report that equipment shortages and power limitations prevent some of the net members from working their own fellow net members.

Headquarters MARS action in obtaining new frequencies and in furnishing crystals for MARS frequencies really should speed up the organization in this area, Lieutenant Thompson reports.

FIFTH ARMY

Many radio amateurs in the Fifth Army Area are sitting impatiently at their rigs waiting for MARS to be expanded so they can join, according to Captain Frank G. Sheviak, Fifth Army MARS Director. "The members we have are good ones, full of enthusiasm for the program," he reports, "but the fellows who can't get in because of no military affiliation, are good ones too."

MARS members report considerable equipment difficulties. Many stations are limited in power and are crystal controlled. Thus, the lack of crystals furnished for operation on MARS frequencies has slowed up the participation. MARS Headquarters is now making more crystals available to aid these "rock bound" boys.

Now being studied at Fifth Army Headquarters is the organization of a phone net. Attention is being given to the use of a radio-telegraph net, radio-telephone net, or both, operating during daylight hours.

SIXTH ARMY

The new director at Sixth Army Area MARS stepped into a crackerjack set-up. Lieutenant Harold H. Haas has moved overseas to the Far East Command and Lieutenant John A. Downey is his successor.

The Sixth Army usually keeps right up at the top of the list in all MARS activities. They also initiated the idea of social gatherings of the bull-session variety. Another "first" to their credit was the adoption of the jacket file accountability and distribution of surplus gear so that more stations could get on the air.

Lieutenant Downey is carrying on the good work started by Haas in rapid and frequent dissemination of materials. When a MARS Command Director is right out there in the field, patting the troops on the back and absorbing all their gripes, he's bound to make a lot of friends for the program.

OM'S get together for an informal session at A6USA, MARS Control Station, Headquarters Sixth Army, Presidio of San Francisco, California. Shown are: Front row—Brennan, A6USA; Welzel, A6USA; Freisleben, A6UJY; Barton, A6DPK; Robinson, A6QIU. Back row—Haas, A6USA; Thourot, A6USA; Hankins, A6WFZ; Downey, A6FPR; Mr. Dapprich (guest); Gibbs, A6FZS; Dapprich, A4KJM; Modder, A6FKX; Detrick, A6EBQ

PROPAGATION DATA FOR MARS USE WITHIN THE UNITED STATES

The following list of usable times and frequencies is prepared and based on 100 watts RF Carrier power delivered to a half-wave antenna mounted 30 feet above the earth. Type of service is cw. All times are local time in your area.

APRIL 1950

Distance (miles)	*3497.5 kc*	*6997.5 kc*	*14405 kc*
250	00–1000	0800–2100	---------
	1400–00		
500	00–0800	170–2200	---------
	1700–00		
750	00–0500	00–0300	1100–1500
	1900–00	0700–00	---------
1,000	00–0500	00–0900	0800–1700
	2100–00	1500–00	---------
1, 500	0002–00	00–0600	0700–2200
	2100–00	1800–00	---------

MARS-ARMY STATION LIST

(A complete roster of Mars—Air Force will be included in the next issue of the Bulletin.)

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A3HLE	Hugh E. Windland, Friendship, Md.
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A3JKL	Edward E. Goldsby, Company A, 51st Sig Opn Bn, Fort George G. Meade, Md.
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A3JPP	Fred H. Travers, 8206 Douglas Road, Wyndmoor, Philadelphia 18, Pa.
A3JSO	Grant E. Woodside, Jr., R. F. D. #1, Timonium, Md.
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A8BYW	Robert E. Miller, 716 Glacier Hts. Road, Youngstown, Ohio
A8CCN	Tom H. Haymond, Route 5, Box 144C, Fairmont, W. Va.
A8CLX **A8UEB**	Calvin R. Basham, 910 Bridge Road, Charleston, W. Va.
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A8DHX	Roy L. Hickman, 515 18th Street, Dunbar, W. Va.
A8DKW	Harvey W. Schwartzenberg, Jr., Aircraft Assembly Plant, 6200 Riverside Drive, Cleveland 11, Ohio
A8DNB	Wilbur A. Sater, 1506 S. 22d Street, Toledo, Ohio
A8DNQ	George H. Evans, R. D. #1, Weirton, W. Va.
A8DNR	Aaron H. Sullivan, Jr., 408 Melrose Avenue, Dayton 9, Ohio
A8DOW	Gilbert A. Priestley, 205½ W. Liberty, Wooster, Ohio
A8DPP	Charles R. Jack, Jr., 1983 Hilton Road, Cleveland, Ohio
A8DQX	Thomas H. Eddy, Jr., 222 Jackson Street, Fairmont, W. Va.
A8DRC	Raymond M. Westfall, 717½ Bigley Avenue, Charleston, W. Va.
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A8EFW	Paul M. Cornell, 4422 Silsby Road, University Heights, Cleveland 18, Ohio
A8EIW	Robert F. Lober, 1521 White Street, Toledo, Ohio
A8EKB	Harry R. Bowen, 121 7th Street, Dunbar, W. Va.
A8EPR	820th Long Lines Company, 7276 S. High Street, Akron, Ohio
A8ERS	Delmar R. Core, R. F. D. No. 1, Sherwood, Ohio
A8FAB	167th Fighter Squadron, Kanawaha Airport, Charleston, W. Va.
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A8IKA	George W. Bunce, Cook Road, North Olmsted, Ohio
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A8KWI	Hobart Burkhamer, 1203 14th Street, Clarksburg, W. Va.
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A8MVW	John E. Osbun, R. F. D. #1, Elyria, Ohio
A8MVZ	James P. Conrad, 8515 Beech Avenue, Brooklyn Village, Ohio
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A8NXN	Walter H. Dettinger, 1339 Filthland Avenue, Toledo 6, Ohio
A8OQV	Francis D. Gilliland, 1537 Laclece Road, South Euclid 21, Ohio
A8OUR	Dawerance H. Skatzes, Route 4, Athens, Ohio
A8OVJ	Forrest E. Hothem, R. F. D. #3, Coshocton, Ohio
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A8PHV	William O. Closey, R. F. D. 8, Box 556, Dayton 3, Ohio
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A8YEW	Nathan B. Crane, Jr., 1920 Stratford Way, Columbus, Ohio
A8YHM	Gerald R. McCasland, 1911 Erie Avenue, Springfield, Ohio
A8YLP	Harold L. House, Route 1, Miamisburg, Ohio
A8YNA	John E. Westphal, Route 4, Swanton, Ohio
A8YNU	Rudolph E. Magill, 322 Cherry Street, Holgate, Ohio
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A8ZGD	James B. Ottney, 20709 Franklin Road, Maple Heights, Ohio
A8ZHN	Calvin C. White, Wyoming Street, Charleston, W. Va.
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A8ZSB	J. Arthur Dawson, Jr., 207 N. Zane Highway, Martins Ferry, Ohio
A8ZVW	James Young, 2120 E. 106th Street, Cleveland, Ohio
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A4BC	Harry W. Robinson, 81 Ora Street, Asheville, N. C.
A4BD	Willard L. Anspach, 201 Louisiana Avenue, Signal Mountain, Tenn.
A4BFQ	Glenn C. Diggs, 616 S. Liberty, Winston-Salem, N. C.
A4BRZ	Alexander J. Reis, 20210 Hickory Avenue, Detroit, Mich.
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A4KJ	Harold B. Doten, 601 E. Montana Avenue, New Port Richey, Fla.
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A4NFF	Phillip F. Hoover, Qtrs. 115, Fort Bragg, N. C.
A4NPL	James Indindoli, Thorne Street, Evergreen, Ala.
A4NQL	Delmar W. Trivett, Springville, Ala.
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A4OUN	James C. Queen, BOQ TC-31, 3d Bn, 505th Abn Inf Regt, Fort Bragg, N. C.
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A4PBA	Rod F. Meaney, Smoke Bomb Hill Area, Fort Bragg, N. C.
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A4PQZ	Olin E. McNeely, 103 N. Clemson Avenue, Clemson, S. C.
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A4SHX	Grover C. Brown, Co. A, 24th Sig Svc Bn, Camp Gordon, Ga.
A4TIS	Albert L. Strohn, Infantry School, Bldg. 1827, Fort Benning, Ga.

A4USA	Signal Section, Hq. Third Army, Fort McPherson, Ga.
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A4VVI	Frederick L. Grover, OIC, K4WAR, Camp Gordon, Ga.
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A4WAE	Joe A. Shannon, University of Alabama, Bldg. HO 17, University, Ala.
A4WAI	3241 ASU ROTC, North Carolina State College, Raleigh, N. C.
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A4WAO	John M. Dortch, 173d Armd Cav Regt, National Guard Armory, Nashville, Tenn.
A4WAR	Camp Gordon Radio Club, Bldg. 24603, Camp Gordon, Ga.
A4WJH	Eugene H. Hunter, Co. B., 4th Sig Bn, Fort Bragg, N. C.
A4WSC	George D. Shaffer, TH 358A, 4th Sig Bn Area, Fort Bragg, N. C.
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A5GAE	Robert W. Jackson, Post Signal Office, Fort Sill, Okla.
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A5HTC	Elmer P. Koenig, 1807 McKinley Avenue, San Antonio 10, Tex.
A5HXB	Fred W. Johnson, P. O. Box 423, Texarkana, Ark.
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A5IOM	Paul N. Winters, W. Center Street, Harrisburg, Ark.
A5IOX	Boyd C. Lawrie, 502d AAA Gun Bn, Fort Bliss, Tex.
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A5JAR	Eugene Hicks, 708 W. Marquette, Albuquerque, N. Mex.
A5JMO	Jesse D. Gates, Rodeo Airport, Rodeo, N. Mex.
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A5LXK	Harold L. Sunderland, Army Field Forces Bd #4, Fort Bliss, Tex.
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A5MPV	Earnest G. Basinger, 927 S. Lahoma, Norman, Okla.
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A5MYM	Francis B. Kaczorowski, 625 Wyona Avenue, Hot Springs, N. Mex.
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A5NQG	John O. Sikes, Jr., 205 E. Roxand, Hobbs, N. Mex.
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A5PWV	Warren S. Quinn, Box 64, Buda, Tex.
A5PYC	Oscar C. Wilks, Jr., Hq Co., 2d Armored Div., Camp Hood, Tex.
A5PZQ	William E. Solomon, Hq., Hq & Svc Co., 41st AIB, Camp Hood, Tex.
A5PZS	Samuel D. Salt, 1604 W. Louisiana, Midland, Tex.
A5QAF	Woodrow A. Jones, Qtrs. 553D, Fort Bliss, Tex.
A5QAH	John E. Kelley, #8 Greer Street, Veterans Village, Stillwater, Okla.
A5QBC	Albert E. Duran, 1600 Fortview Road, Austin, Tex.
A5QBY	John A. Lockerd, Room 320, West Hall, Texas Tech., Lubbock, Tex.
A5QCT	Frederick F. Quist, P. O. Box 1105, Fort Bliss, Tex.
A5QDQ	Cleveland P. Huggins, 1220 Butterfield, El Paso, Tex.
A5QGI	Eldred C. Cooley, Route 56, Box 199, El Paso, Tex.
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A5QHJ	William C. Gann, Route #2, Box 258, El Paso, Tex.
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A5QJN	Howard H. Cole, 1232 N. Stanford, Albuquerque, N. Mex.
A5QLG	James E. Pipkin, 9361st TSU, Red River Arsenal, Tex.
A5QLO	Sven A. Bach, 479 Wheaton Road, San Antonio, Tex.
A5QNL	Clarence E. McCardie, 68 West Hooks Courts, Texarkana, Tex.
A5QNM	Bobby R. Bilderback, 703 Laird Avenue, Kilgore, Tex.
A5QPR	Harry E. Lindie, Sunrise Acres, El Paso, Tex.
A5QQT	Neil C. Keith, 3655 Bisbee, El Paso, Tex.
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A5QWB	August J. Sabel, 525 El Molino Drive, Las Cruces, N. Mex.
A5QWE	Benjamin I. Hill, Qtrs. 552D, Fort Bliss, Tex.
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A5WAC	Charles E. Remick, Fort Bliss Amateur Station, Bldg. 504-B, Fort Bliss, Tex.
A5WAE	Albert E. Duran, Texas National Guard, Camp Mabry, Austin, Tex.
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A5WAI	4517 ASU ROTC, Oklahoma A & M College, Stillwater, Okla.
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A5WAM	90th Signal Company, 1807 McKinley, San Antonio 10, Tex.
A5WW	William W. Adams, Signal Section, Hq. Fourth Army, Fort Sam Houston, Tex.
A5WZK	Leonard N. Silbert, Co. A, 43d Armored, Inf Bn, Fort Sill, Okla.
A5ZAB	Joseph A. Pullen, 819 E. Main, Houma. La.
A5ZM	New Mexico Military Institute Radio Club, Roswell, N. Mex.
A5ZU	George M. Sayre, 1621 N. Kansas Avenue, Roswell, N. Mex.
A5ZWS	John A. Postle, Bldg. 617, Co. C, 3d Bn, MFSS, Fort Sam Houston, Tex.

FIFTH ARMY

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A7JDB	Lawrence L. Daily, 1205 Lewis, Laramie, Wyo.
A7JMM	Donald G. Huffaker, 148 W. Burrows, Sheridan, Wyo.

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A7MUG Robert E. Williams, 1322 Court Place, Rawlins, Wyo.
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A8WAF 5241st Sig Svc Group, 6301 W. Jefferson, Detroit 17, Mich.
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A8ZUY Henry A. Blum, 19326 Hershey, Detroit, Mich.
A8ZYD Virgil R. Owens, 702 Lawson, Royal Oak, Mich.
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A9AZJ Robert H. Decker, 311 Read Street, Evansville, Ind.
A9BEW Glen V. Blakeslee, 649 Summer Street, Eau Claire, Wis.
A9BIN Charles H. Perdew, 902 Front Street, Henry, Ill.
A9BSR John J. Crittenden, 3250 N. Downer Avenue, Milwaukee, Wis.
A9CAD Thomas R. Warner, 4 S. Greenwood, Palatine, Ill.
A9CIU Frederic C. Shidel, Jr., 414 Brewster Avenue, Lombard, Ill.
A9CQU William F. Spanke, 254 Cleveland Street, Gary, Ind.
A9CUV Lawrence J. Lynch, 24 Brittany Lane, Rock Island, Ill.
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A9DCG Ralph E. Moorhouse, 915 Park Avenue, Pekin, Ill.
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A9FMP Voyle R. Dawson, 12606 S. Lowe Avenue, Chicago 28, Ill.
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A9GAL Louis F. Kruse, 3028 Western Avenue, Park Forest, Chicago Heights, Ill.
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A9GHW Frank C. Ahlgrim, 4642 Middaugh, Downers Grove, Ill.
A9GIO Robert G. Christianson, 310 Wilson Avenue, Menomonie, Wis.
A9GLR James G. Card, 609 W. Illinois, Urbana, Ill.
A9GUK Thurman Ridgway, 1614 N. Wilber Street, South Bend, Ind.
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A9GZX Emro J. Quashnock, 1817 Vahlen Avenue, Madison 4, Wis.
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A9WAC	Hq & Hq Co., 1st Bn, 123d Inf, Illinois NG, 109 E. Park, Champaign, Ill.
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AØLHS	William D. Synder, 205 S. 14th Street, Fargo, N. Dak.
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AØLPU	Melvin L. Andrew, R. F. D., Brownville, Nebr.
AØMFT	Kermith W. Trimble, 1521 Stevens, Parsons, Kans.
AØMID	Fred S. Jones, 405 Sunflower Road, Sunflower, Kans.
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AØSKA	Jack B. Harvey, Tarkio, Mo.
AØSUI	Vern M. Buttenob, Howard, S. Dak.
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AØTUH	George M. Park, Jr., 300 N. 3d Street, Atchison, Kans.
AØUJE	Max E. Norman, Box 382, Station A, Ames, Iowa
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AØVKP	Everett E. Hill, 406 8th Street South, Fargo, N. Dak.
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AØZQT	Gerald F. McKee, Adjutant General School, OCS, Fort Riley, Kans.
AØZSX	Merrill E. Chesebrough, Box E, LeRoy, Minn.
AØZXW	Lawrence R. Thielen, 817 8th Avenue, Brookings, S. Dak.

SIXTH ARMY

A6AAQ	Donald K. Johnson, 15795 Via Arroyo, San Lorenzo, Calif.
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A6AUQ	Ray W. Hitchcock, 414-A Hornet Street, China Lake, Calif.
A6AZ	Anthony E. Welzel, 700 Ohio Avenue, Apt. 1A, Richmond, Calif.
A6BAF	Harold E. Spaulding, Jr., 4729 Gundry Avenue, Long Beach, Calif.
A6BBT	Albert N. Baxter, Jr., 1337 S. Valencia, Los Angeles, Calif.
A6BCV	Charles P. Weber, 1032 Beryl Street, San Diego 9, Calif.
A6BHI	Norman Williams, 2925 Bristol Avenue, Stockton, Calif.
A6BKU	Arthur D. Hendricks, 208 E. Figueroa, Santa Barbara, Calif.

A6BMX	Earl P. Olsen, 142 B Street, Port Hueneme, Calif.
A6BNO	Leonard J. Sluyter, 1887 N. Avenue 52, Los Angeles 42, Calif.
A6BNR	Emil O. Rettig, 6130 Monadnock Way, Alameda, Calif.
A6BRT	Grover C. Chaffin, Qtrs. 527, Fort McArthur, San Pedro, Calif.
A6BSJ	Richard W. Keusink, 1121 Bryant Street, Apt. 1, Palo Alto, Calif.
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A6CVX	Garnet C. Odlum, 445 Cole Street, San Francisco, Calif.
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A6DNR	Robert A. Wise, 335 Hill Street, San Francisco 14, Calif.
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A6EBQ	Donald M. Detrick, Qtrs. 827D, Fort Barry, Calif.
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A6EIA	Lloyd C. Stepleton, 205th Signal Repair Company, Fort Lewis, Wash.
A6EPI	Walter E. Puckett, U. S. Navy Communication Station, Skaggs Island, Sonoma, Calif.
A6EWZ	Herbert C. Mitchell, Two Rock Ranch Station, Petaluma, Calif.
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A6VPG	Frank R. Humphery, Route #1, Box K 34, Lakeside, Calif.
A6VUE	Edgar L. Esterwold, 1900 Beverly Boulevard, Montebello, Calif.
A6VYY	Olen R. Beach, 1869 W. 38th Place, Los Angeles, Calif.
A6WAA	Don C. Smith, 700 Exposition Boulevard, Los Angeles, Calif.
A6WAC	Victor DeStefanis, Quarters 305-B, Fort Miley, Calif.
A6WAD	Louis M. Sieber, 727 B Presidio, San Francisco, Calif.
A6WAF	William O. Davis, Bldg. 39, Field Annex, Sharpe Gen. Depot, Lathrop, Calif.
A6WFD	Cam Longley, Jr., 821 Plaza Drive, San Jose 10, Calif.
A6WFZ	LeRoy G. Hankins, Quarters 919-D, Fort Barry, Calif.
A6WLI	Norman Brooks, 654 55th Street, Sacramento, Calif.
A6WQD	Robert J. Allen, 1600 Maine, Apt. 10, Richmond, Calif.
A6WRG	Kenneth I. Rubin, 5139 W. 21st, Los Angeles, Calif.
A6YGZ	Rodney C. Rigg, 503 E. Jackson, Stockton 13, Calif.
A6YOY	John P. Lindley, 2251 College, Berkeley, Calif.
A6ZBV	Cecil A. Crafts, 1439 Topeka, Pasadena, Calif.
A6ZEH	James E. Kennedy, Jr., 2508 Ridge Road, Berkeley 9, Calif.
A6ZID	Adolph T. Beyer, Two Rock Rank Station, Petaluma, Calif.
A6ZIO	Clarence W. Ellers, 140 Myrtle Street. Santa Cruz, Calif.
A6ZLX	Dean E. Stiles, 4616 Congress Avenue, Oakland, Calif.
A6ZQL	Clifford A. Frink, 2109 Dymond Street, Burbank, Calif.
A6ZQM	Floyd E. Claunch, 2319 Spaulding Avenue, Berkeley, Calif.
A6ZVP	Charles V. Sheetz, 3708 Heaton, Frenso, Calif.
A6ZXY	Albert R. McLane, 131 E. Vista Avenue, Daly City, Calif.
A6ZZM	Millage C. Nolen, Two Rock Ranch Station, Petaluma, Calif.
A7AWA	Walter A. May, Jr., Route 8, Box 731, Tucson, Ariz.
A7BAQ	Austin L. Foster, R. F. D. 1, Burton, Wash.
A7BLM	Ariel T. Johnson, R. F. D. #3, Box 308-A, Ogden, Utah
A7BLN	George W. Worthley, 2051 Telegraph, Oakland, Calif.
A7BSD	George L. Buck, Jr., Route 2, Box 262, Bellevue, Wash.
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A7CAY	William F. Antes, 1422 N. Prospect Street, Tacoma 6, Wash.
A7CJC	Stanley L. Rinehart, Route #4, Box 2690, Spokane, Wash.
A7CKL	Carl L. Myers, 1244 N. 30, Billings, Mont.
A7CRL	Clifford A. Jessup, 910 E. A Street, Moscow, Idaho
A7CWL	Waino A. Lauri, 3239 W. 61st Street, Seattle, Wash.
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A7DOP	Dan M. Molver, Route 1, Box 215D, Albany, Oreg.
A7DYF	William T. Stratton, Jr., Box 13, Beaverton, Oreg.
A7EBH	Dorman D. Taylor, 1911 Stevens, Seattle, Wash.
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A7FPK	John B. Schaerer, Route 1, Box 160R, Roseburg, Oreg.
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A7HVK	Gordon C. Lynch, 311 Josephine Street, Rosalia, Wash.
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A7IPV	Philip F. Eddy, 744 S. 14th, Corvallis, Oreg.
A7IRT	Arthur M. Compton, 608 Roseway Drive, Klamath Falls, Oreg.
A7IUY	James R. Shadduck, 1145 6th Street, Elko, Nev.
A7IVC	Dewey H. Daniels, 1909 Hay, Shelton, Wash.
A7IWH	Wendell W. Motter, 1265 22d Street, Ogden, Utah
A7IXD	Robert E. Baehr, 507 Milwaukee Avenue, Deer Lodge, Mont.
A7IZE	Joseph A. Amicarella, 4335 S. W. Corbett Avenue, Portland, Oreg.
A7JAN	Vincent Hook, 3735 S. Fawcett Avenue, Tacoma 8, Wash.
A7JFI	Philip E. Jemison, 301 S. Jackson Street, Butte, Mont.
A7JGB	John Curtis, 132 W. Lincoln Street, Tucson, Ariz.
A7JGT	Elmer A. Grankull, 308 S. Charleston Avenue, Bremerton, Wash.
A7JIY	George E. Peek, 701 E. Fifth Street, Tucson, Ariz.
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A7JTB	John E. Ogden, 3117 N. E. 32d Avenue, Portland, Oreg.
A7JTF	William J. Dobyns, 3024 N. 31st, Tacoma, Wash.
A7JTZ	John L. Shennum, 823 W. Lamme, Bozeman, Mont.
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A7LHI	William J. English, 3938 E. Elmwood, Tucson, Ariz.
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A7LKM	Robert L. Bradley, 449 E. 3d South, Salt Lake City, Utah
A7LOM	Wilbur E. Deacon, McKenzie Bridge, Oreg.
A7LSH	Harold L. Willingham, Route 1, Box 383, Orting, Wash.
A7MCK	Morgan Z. Evans, 21st & Hill Street, Port Townsend, Wash.
A7MCR	George E. Gebhardt, 648 S. 11th, Coos Bay, Oreg.
A7MDE	Charles W. Clay, Jr., 524 N. Long, Greenacres, Wash.
A7MDF	Harry M. Barker, 625 N. Argonne, Dishman, Wash.
A7MHT	Robert L. Hickerson, 1021 N. 25th Street, Corvallis, Oreg.
A7MIN	Frank S. Perry, P. O. Box 54, Lakeview, Wash.
A7MIS	Benjamin W. Coleman, 513 Wooding Street, Aberdeen, Wash.
A7MQN	Leland B. Hallett, 287 Signal Company, 2 ESB, Fort Worden, Wash.
A7MTW	Arthur L. Cummings, 4220 S. E. Corbett Street, Portland, Oreg.
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A7NAA	John H. Stewart, 945 Harvard, Billings, Mont.
A7NEL	Norman A. Van Houten, 1845 E. Oak Street, Phoenix, Ariz.
A7NEO	Clifford Steagall, 1800 E. Mohave Street, Phoenix, Ariz.
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A7NHA	Peyton J. Nelson, 1450 W. 12th Avenue, Eugene, Oreg.
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A7WAC	Morgan Z. Evans, 287th Sig Co, 2d ESB, Bldg. 233, Fort Worden, Wash.

A7WAD	George H. Caple, Jr., Bldg. 632, Vancouver Barracks, Vancouver, Wash.
A7WAE	Wendell W. Motter, 222 F. A. Bn, Utah NG, 441 23d Street, Ogden, Utah
A7WAG	163rd Inf, Montana NG, 24 W. Mendenhall, Bozeman, Mont.
AL7PF	Paul I. Sell, U. S. Weather Bureau, Kotzebue, Alaska
AL7PP	George C. Bunnell, Jr., Alaska Comm System, Adak, Alaska

USARPAC

AB6AAG	William C. Moran, Bldg. 50, Apt. D, Manana Vets Homes, Pearl City, T. H.
AB6AAL	John A. Mercer, Jr., 726 Schofield Barracks, Oahu, T. H.
AB6AAQ	Roy R. Williams, Qtrs. 18, Area "A", Schofield Barracks, Oahu, T. H.
AB6AAX	Earle F. Cook, 616F Dawson Street, Schofield Barracks, T. H.
AB6AAY	Thomas W. MacClure, 319 Inf Loop, Schofield Barracks, Oahu, T. H.
AB6ACB	James A. Long, MARS Director, USARPAC, APO 958, c/o Postmaster, San Francisco, Calif.
AB6AF	Leslie Coleman, 1959 AACS, APO 105, c/o Postmaster, San Francisco, Calif.
AB6AI	Manuel M. Camunias, c/o CAA, Palmyra Island, T. H.
AB6FX	Irvin S. Liner, 3137 Kaohinani Drive, Honolulu 17, T. H.
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AB6UP	Gerard D. Furlong, 8274th SU Hq ORC, APO 958, c/o Postmaster, San Francisco, Calif.
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AB6VV	Richard S. Ferrell, Qtrs. 119, Area B, Schofield Barracks, Oahu, T. H.
AB6WA	William D. Kreuzinger, 435 Seaside Avenue, Honolulu, T. H.
AB6WQ	William H. P. Chow, 1986 Iwi Way, Honolulu, T. H.
AB6WS	Gerald J. Collins, 607 Gorgas Road, Schofield Barracks, Oahu, T. H.
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AB7AWR	Charles R. Beaman, N. S. C. Navy 926, F. P. O., San Francisco, Calif. (Guam)
AB7LJK	John R. Nayadley, 1958th AACS Sq, APO 184, c/o Postmaster, San Francisco, Calif.

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AE2US	John Moss, USAGG, APO 206, c/o Postmaster, New York, N. Y.
AE3US	Fred P. Elser, American Embassy, Ankara, Turkey
AE4US	George Darwin, 9434 TSU, MESSD, APO 843, c/o Postmaster, New York, N. Y.

U. S. GOVERNMENT PRINTING OFFICE: 1950

SAMPLE LOG
ARMED FORCES DAY QSO PARTY
LOG OF STATION W5XYZ

FREQ. BAND (MC)	PHONE OR C.W.	LOCAL TIME	STATION WORKED	MESSAGES HANDLED	POWER (COM'L OR EMERG)	POINTS
14 Mc	Phone	1321	W1SZ	Orig Nr 7	Com'l	11
"	"	1326	KL7BC	-	"	1
7 Mc	C.W.	1403	W7COH	-	Emerg	2
"	"	1411	W4KFC	Rcd Nr 14	"	6
"	"	1413	WØGBJ	-	"	2
3.5 Mc	"	1728	W9BRD	-	Com'l	1
"	"	1735	K8NRA	Rcd 8, Sent 14	"	5
"	"	1737	W4KFC*	Rcd Nr 63	"	2
28 Mc	Phone	1840	K6USA	Sent Nr 8	"	3
"	"	1852	W3ADP	-	"	1
"	"	1909	W2JLE	-	"	1

*Station worked a second time; credit for message only.

FINAL SCORE: 35

Summary: Bands used - 3.5 Mc c.w.; 7 Mc c.w.; 14 Mc phone; 28 Mc phone.

Different Stations Worked - 10

Number and calls of operators: One (1) - W5XYZ

Signature: Joe Doe, W5XYZ
Address: 22 Contact Street
Hamdom, Texas

ARMED FORCES DAY RECEIVING COMPETITION
20 MAY 1950

	TIME	
NSS Washington	0200 GCT (2100 EST) 0400 GCT (2300 EST)	122, 4390, 9425, 12630, 17000 kc
NPG San Francisco	0400 GCT (2300 PST) (2000 PST)	115, 4390, 9255, 12540 kc
WAR Washington	0200 GCT (2100 EST) 0400 GCT (2300 EST)	3497.5, 6997.5, 14405, 20994, 27994 kc

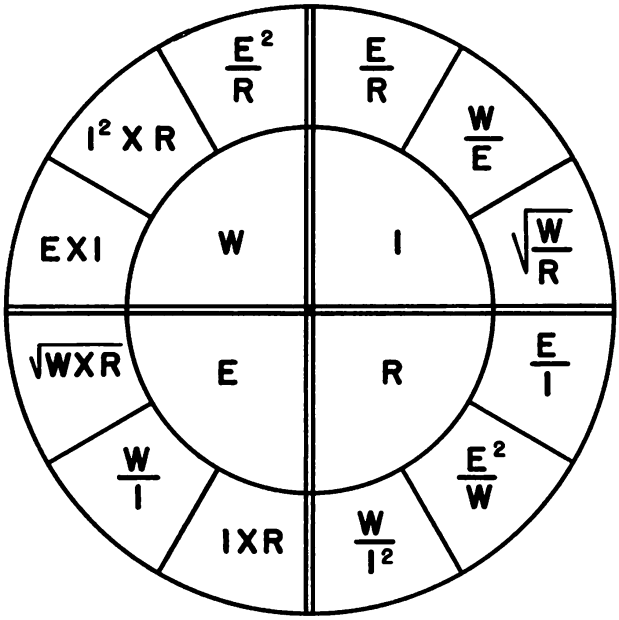
MARS BULLETIN

SEPT. 1950
Vol. 2, No. 1

Military Amateur Radio System

PENTAGON BUILDING, WASHINGTON, D. C.

EQUATIONS BASED ON OHMS LAW



I = CURRENT IN AMPERES
E = POTENTIAL IN VOLTS
R = RESISTANCE IN OHMS
W = POWER IN WATTS

IN 1827 GEORGE SIMON OHM EXPRESSED THE RELATION OF THE CURRENT, VOLTAGE AND RESISTANCE IN A SIMPLE D.C. CIRCUIT AS $I = \frac{E}{R}$. THIS IS CALLED OHMS LAW.

JOULE'S LAW, $W = E \times I$, COMBINED WITH THIS GIVES THE ABOVE 12 EQUATIONS.

MARS BULLETIN

SEPTEMBER 1950

VOLUME II NUMBER 1

***ABOUT THE COVER**: Donna Helene Meister, daughter of Lt. Leo Meister, AF2UMB/W2UMB, deserts her doll for ham radio. Helene, now somewhat older than when this pix was made, is a seasoned op; she handles the mike with her old man flipping the switches.*

CONTENTS

CQ. . . CQ. . . CQ. . .

The Military Amateur Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control.

The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate Chief; either to Chief, MARS—Army, room 5B519, the Pentagon, Washington 25, D. C., or Chief, MARS—Air Force, room 5C165, the Pentagon, Washington 25, D. C.

EDITORIAL

The results of our first Armed Forces Day program for radio amateurs provide many interesting clues for next year's event. The program wasn't all MARS—we had the full cooperation of the Naval Reserve program, headed up by Commander E. L. Battey, W4IA, whom most amateurs will remember as former Assistant Communications Manager for the American Radio Relay League. But the program, *for the first time* on a national basis made a unified appeal by all military units for coordination with radio amateurs everywhere.

This is particularly encouraging because the MARS program is beginning to "jell," into a pattern of communications readiness to assist state and local authorities in disaster and civilian defense planning. MARS plans cut across the path of every other organization doing a similar job, and it is encouraging to know that the MARS, the Navy, and the vast body of civilian or unaffiliated hams can work together on the planning end of network organization as well as integrate systems and facilities in the field. It matters little who actually is NCS on a disaster net. Maybe the fellow best qualified to run the show in a disaster-struck town is the communications chief of a police net; perhaps a taxicab net is organized and operating within the community already. Undoubtedly, in any disaster, the local area hams will spearhead the initial communications hook-up. But to get the best possible use out of all the equipment and all the operators, there must be coordination.

Overheard recently was the remark of an amateur operator, "The military will try to cram the GI way of doing things down our throats. What's the advantage of military over normal amateur net procedures?"

Well, there is an advantage—a distinct one. In any national emergency or in any local area disaster of major importance, it is dollars to doughnuts that the military—National Guard, Reserve Units, Coast Guard auxiliary, Civil Air Patrol, or the Continental Army, Air Force or Naval District concerned—is going to be called on to furnish assistance of some sort. Now each of these organizations uses Joint Army-Navy-Air Force procedures, both radiotelegraph and radiotelephone. It is logical that MARS should adopt procedures already in effect in all other military-affiliated units, and should preach and teach adoption by radio amateurs everywhere. A completely integrated disaster radio net, available to any community, depends on the success of such teaching.

THE VACUUM TUBE

Because the vacuum tube is the medium of electronic conduction, the Chiefs, MARS, believe a history of the development of the "bottle" will be of general interest to all MARS members and will be especially valuable in the instruction of the Amateur Newcomer. Nothing new or startling is contained herein. It may, however, be a bit more palatable than the technical language of a textbook.

The discovery of the vacuum tube is generally credited to Thomas A. Edison who first made known the discovery of the "Edison Effect" in 1883. Edison discovered that when he placed a metallic plate opposite the carbon filament in an incandescent lamp, a current flowed between the filament and plate WHEN THE PLATE WAS CONNECTED TO THE POSITIVE TERMINAL OF THAT FILAMENT. The current flow stopped when the plate was connected to the negative terminal of that filament.

In chronological sequence the following important discoveries and developments followed.

FLEMING VALVE

John Ambrose Fleming, an English scientist of note, used a vacuum tube with a filament and plate as a unidirectional electrical conductor in place of the crystal detector which was in popular use at that time. He called his device the "Fleming valve," because it acted as a mechanical valve. It conducted current only when the plate was positively charged during the positive half-cycle of the radio waves. Conduction was completely cut off during the negative halves of the cycles. Actually, there was very little difference between the Fleming valve and the modern vacuum tube rectifiers which are used to convert alternating current into direct current in every radio receiver which operates today from an alternating current power line.

PHOTOELECTRIC CELL

One discovery led to another. Count Heinrich Hertz, best known for his discovery of radio waves, extended his field of experiment widely. Shortly after the discovery of the Edison effect—about 1887—he was experimenting with spark gap effects when he observed the phenomenon which established the foundation for the modern development in photo electricity and photo electric cells. The "electric eye" or photo electric cell is a unit designed for electronic conduction where the electron flow is controlled by the incident light. Hertz noticed that at the interval of a large

spark gap the high voltage discharge had a direct and marked influence on the discharge across a smaller spark gap located directly opposite it. When the light was blocked from the smaller gap, its spark was shorter than when it was allowed to be illuminated by the discharge of the large spark gap.

WILLIAM HALLWACH

About 1 year later another important discovery was made. Wilhelm Hallwach observed that when an electroscope provided with a zinc sphere was exposed to ultraviolet light, the zinc sphere gave up its negative charge. "Hallwach's Effect" established definitely the nature of the charge emitted when the zinc sphere was influenced by the ultraviolet light. Today we know those negative charges as electrons.

Two scientists, Elster and Geitel, working together, extended Hallwach's discovery still further in 1889. They experimented with different metals and learned that the alkali metals, such as sodium or potassium, treated with mercury, gave off electrons, negative charges, when subjected to ordinary visible light as well as under the influence of ultraviolet light. To them goes the credit for construction of the first photoelectric tube; it differed only slightly in general basic design from modern phototubes.

LEE DE FOREST

Development of the audion tube by Lee De Forest was the trick that really put radio into business. In 1907, De Forest perfected an invention called the audion tube which was similar in basic construction to the Fleming valve, with one exception. The audion tube contained an additional element between the plate and filament. This additional element, known as the "grid," consisted of a fine wire lattice work which carried a small electric charge which could be varied in magnitude. Thus the grid was capable of either accelerating or impeding the electron flow to the plate, the flow being dependent on the charge placed on the grid. The grid control principle of the audion tube established the basic design principle utilized in modern electron tubes.

THE ELECTRON THEORY

We have looked briefly at some of the names in vacuum tube development and the discoveries with which they are associated. However, any study of tubes demands a familiarity with the basic principles of the electron theory. Let's review that theory briefly.

THE ATOM

All matter is made up of atoms or combinations of atoms, called molecules. The forces holding the atom together are electrical in nature. Atoms differ one from the other chiefly in the number and the arrangement of the electric charges they contain; they are so small that there may be millions of them on a pin point. The positive and negative charges of an atom nucleus are called protons and electrons, respectively. The protons predominate, so that the atom nucleus is always positively charged.

Since an atom is electrically neutral, and inasmuch as its nucleus is positively charged, it follows that there must be associated with it—around the nucleus—an equal amount of negative electricity. These extranuclear electrons are sufficient in number to balance the positive charge of the nucleus, but they are not so closely bound together, and they can be made to leave the vicinity of the atom nucleus without too much urging.

The number of protons on the nucleus is called the atomic number. This number determines the quantity of extranuclear or orbital electrons which in turn determines the chemical properties of an element or atom.

Orbital electrons move around the nucleus somewhat similar to the way planets revolve around the sun. Their orbits are fixed paths determined by the charge on the nucleus and the number of electrons. It is this characteristic which allows us to use them in the vacuum or, properly speaking, the electron tube.

GASEOUS CONDUCTION

The electron tube is a medium for electronic conduction through a vacuum or a gas at low pressure.

If a glass tube is fitted with metal plates at each end and is filled with a gas at reduced pressure, an electric current may be passed through the gas if a high voltage is applied across the metal terminals.

Here's what happens. With voltage applied across the tube the positively charged plate attracts a few negatively charged electrons. These electrons acquire considerable velocity because of the electric charge and because the reduced gas pressure permits electrons to travel farther before colliding with other gas atoms. When an electron does collide with an atom it displaces, or knocks loose, other electrons which also move toward the positive plate. They, in turn, jar loose still more electrons on their way.

Atoms which lose electrons become "ions"—positive ions—which move toward the negative plate. Being heavier than electrons, ions travel more slowly. Once at the negative plate they

acquire electrons and become neutral atoms again. This flow of electrons from the negative plate (the cathode) to the positive plate (the anode) is the basis of all electronic tube conduction. Thus, electronic conduction is dependent on two elements:

1. The source of electrons.
2. A positively charged electron terminal (collector).

If a suitable metallic conductor, such as tungsten or thorium oxide, is heated to a high temperature in a vacuum, electrons are emitted from the surface. In most thermionic tubes the cathode, or electronic emitter, is heated to a temperature of about 2,200° C. at which point energy is imparted to the electrons of the material so that many of them tend to escape from the surface of the cathode.

The passage of electrons from cathode (sometimes called filament) to anode constitutes an electric current.

By regulating the current through the cathode so as to reduce the current; that is, by lowering the temperature, the plate current also is reduced. Conversely, by increasing the filament current—raising the temperature of the cathode—the plate current is increased.

In the next issue we will continue the discussion of the relationship of cathode current to plate current and will take up the two electrode and three electrode tubes.

THE ART OF CONVERSION

By R. B. Jeffrey, NCS Ohio Mars, A8GDC

Captain Jeffrey, Ohio Mars spark plug, sent in the following article as an inspiration to the fellow who is "rock bound."

Since the Mars Chief has stuck his neck out and asked for contributions, here is mine. I have been horrified for some time at the butchery that has been perpetrated on some of the surplus gear in the name of "conversion."

Having converted some two dozen or so of the SCR 274 components myself, I would like to pass along the easy way to those who may not yet have converted theirs. My conversion takes about 20 minutes, with another 20 minutes or so being used up if the frequency range has to be changed. This applies to the BC–457, 458, 459, 696, and their ARC–5 counterparts.

Since these units were designed to use a fairly short, end-fed antenna, there is no reason to remove the antenna tuning coil as some of the published "conversions" have advocated. If portable work is contemplated, particularly this should be left "as is." When set to zero the antenna loading coil is completely out of the circuit. The relays, however, should be either removed or rendered inoperative as their use will produce a thump or chirp in keying. The simple conversion using a 24 volt filament supply, follows:

1. Remove the resistor (either 1,500 or 200 ohms) from filament to cathode on the 1629.
2. Lift the arm of the antenna relay up over the antenna contact and solder in place; remove the relay if desired.
3. Short the two red wires on the relay under the chassis; the relay may be removed if desired.
4. Cut the white wires to the two relays and either tape the ends or trace the wires back and remove them.
5. Add a 0.006 MFD bypass condenser from cathode to ground on either 1625.
6. Add a 100-ohm filter resistor from cathode of the other 1625 to key. A key jack may be added to the front panel or the black wire that went to the relays may be used.

The transmitter is now converted! If it is a BC–459 or 696, it is ready to go. A BC–457 can be realined to 80 meters and a BC–458 to 40 meters *without touching the coils.* Alinement procedure follows:

1. Remove the can which covers the oscillator coil and drill a 3/8″ hole in line with the padding condenser shaft; loosen the set-screws in the shaft lock on the padding condenser; replace the can, *replacing all the screws.*

2. Loosen the set-screws in the shaft lock on the PA padding condenser and remove the snap button (the small one) in the side of the chassis.

3. Insert a milliameter in the keying lead; apply 200 volts to the oscillator and PA plate and 100 volts to the screens of the PA tubes.

4. With the dial at the high-frequency end of its range, tune the oscillator padder for the desired frequency and then tune the PA padder for minimum plate current.

5. With the dial at the low-freqency end of its range, tune the slug in the PA coil for minimum plate current. If it was not possible to get the desired frequency range with the oscillator trimmer, the oscillator slug may also be moved before the PA slug is tuned.

6. Recheck at the high-frequency end, tuning the PA trimmer condenser for minimum plate current. This minimum should now hold over the entire tuning range. If not, recheck, remembering that you tune condensers at the high-frequency end and lugs at the low-frequency end of the range.

With this procedure it has been found that the BC–457, 458, 459, and 696 can be used at full input. Rated input for the tubes used is *150 watts*. They have been operated here quite satisfactorily with a considerable over-voltage on the PA plates; at present the voltages are 1100 on the PA plates, 225 screen, and 240 on the oscillator, the latter regulated with a VR–150 and a VR–105 in series. Rated voltages are: PA plate 750, PA screen 250, oscillator 250. In either case the rated PA plate current is 200 MA, and the PA grid bias measured from pin 2 on the cable socket to ground (with a 20,000 ohm per volt meter) should be at least —50 volts. The more bias the better the unit will work!

THE SCR 522

Are you troubled with audio howl in your receiver? Want to know how to get approximately 25 to 35 percent additional audio output? Interested in making your receiver more sensitive?

I did it, and you can do it too. Don't ask me how I found out—or why I did what I did—because I don't know. But here's what to do.

First, completely remove the interphone transformer from the circuit (transformer 295). Keep track of the wires that connect to this transformer including a by-pass condenser (214) and a resistor (262–2) connected right at the transformer terminals

(terminal 5 for the condenser and terminals 6 and 7 for the resistor).

Connect the wires formerly on pin 7 and pin 1 of transformer together and tape the splice so it won't short out. (Do not bypass this lead.) When the job is finished you have connected the grid of the 12C8 tube thru an RF choke, resistor (272), condenser (206–17), to the center leg of volume control (286), thus completing the circuit.

For me the above really worked. Signals that were formerly S1 to S2 were increased to S9 plus. In fact, taxicab frequencies around 160 MC in communities 25 miles distant came in so loud that by just "cracking" the audio gain I could hear them; FM stations came in so loud I nearly drove the cone right out of the speaker.

My receiver is the model BC–625–C and has the 12A6 audio stage. If you have the 12J5 audio tube, suggest you replace it with a 12A6. It is rated at 300, but with 250 volts mine is giving me another bucketful of audio.

JAMES T. CONNER, A3HCE.

INTRODUCTION TO ANTENNAS

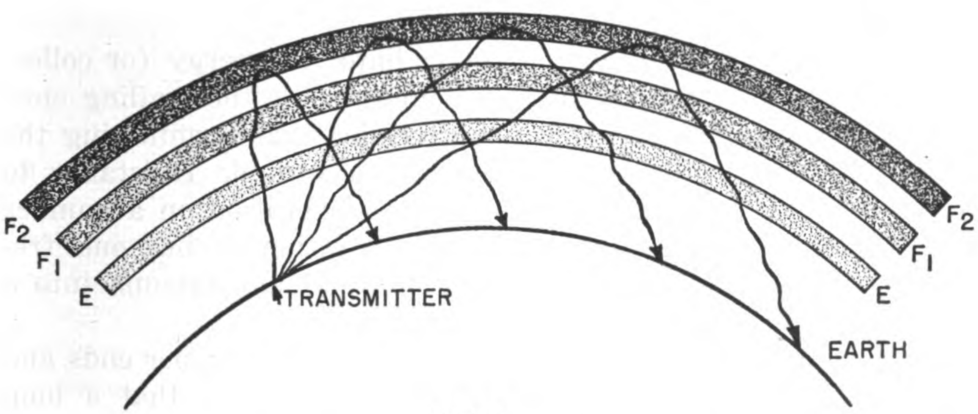
By Alton Hart, Radio Engineer, WAR, W3AX

This is the third article of a series on antennas written for Mars by Mr. Alton Hart, Signal Corps Engineer. The series, written for the radio amateur newcomer, is also a ready reference for the old timer.

V. THE INCLINED V ANTENNA

The effect of inclining the antenna from the horizontal plane.

We have seen how a pronounced directional effect is produced by reinforcing one of the lobes of a radiated wave. In the basic V antenna discussed in the preceding Mars Bulletin, Volume I, No. 2, April 1950, this was accomplished by combining the lobes of two long wires so that a third major lobe appeared and bisected the angle between the wires. An equally important consideration in effective transmission, however, must not be forgotten; and that is the angle at which the beam will be transmitted. This is the "angle of fire" or "wave angle." Its importance lies in the fact that the transmitted ray is reflected by the ionosphere and the angle at which it strikes the layers forming the ionosphere will determine to a large degree whether or not the signal will



NOTE:
F_2 LAYER TRANSMISSION AT HIGH FREQUENCIES (15 TO 30 MEGACYCLES). THE WAVES ARE PARTIALLY BENT IN GOING THROUGH THE TWO LOWER LAYERS, BUT NOT SUFFICIENLY TO RETURN TO EARTH.

Figure 1.

be received at the distant point. In figure 1, let us assume the angle of fire is 20°. The beam strikes the ionosphere and is reflected downwards toward the receiving station. As the angle of fire is increased to, let us say, 50°, the ray may enter the ionosphere and be attenuated or lost rather than be returned to the

earth. The extent that reflection occurs is determined by the density and height of the ionosphere, with consideration given to a multiple of other factors including the frequency of the transmitted wave. It might be well to mention the path length. For maximum efficiency it is necessary to assure a wave angle within the "critical angle" category, that is, one which will allow the beam to be reflected from the ionosphere at a proper angle to reach its destination.

The wave angle is a resultant determined by the height of the antenna above ground, the relationship between the direction and earth reflected ray, the relationship of the wires forming the antenna and the degree of inclination from the horizontal or vertical position that an antenna assumes with the plane of the earth.

In the inclined V, this last factor becomes of great importance as the antenna is deliberately designed so that it slopes from one end (the "Apex") toward the earth and degree of inclination will determine to a large extent the resultant wave angle. Actually, tilting the V from the horizontal plane, increases the low angle of radiation off the low end and decreases it off the high end.

The Trailing Ends.

An inclined V may be considered as consisting of two essential parts:

1. The elevated portion.
2. The portion close to the ground (called the "trailing ends").

The elevated portion acts as the radiator of energy (or collector in the case of the receiving antenna) while the trailing ends act as the terminations. It will be recalled that terminating the ends of a long wire antenna through a suitable resistance to ground makes it nonresonant and allows operation on a number of frequencies rather than limiting operation to but one frequency. In addition it converts the bidirectional antenna into a unidirectional one.

It is difficult to say exactly where the antenna proper ends and the termination begins, but experience has shown that a long wire near the ground does not conduct RF current without heavy loss. For practical purposes, then, the trailing ends are said to begin at that point along the wire where it aproaches to within 15 or 20 feet of the ground.

The importance of the trailing ends cannot be overestimated, just as the importance of ordinary resistance to ground termination vitally affects the operation of the horizontal V as well as other nonresonant long wire antennas.

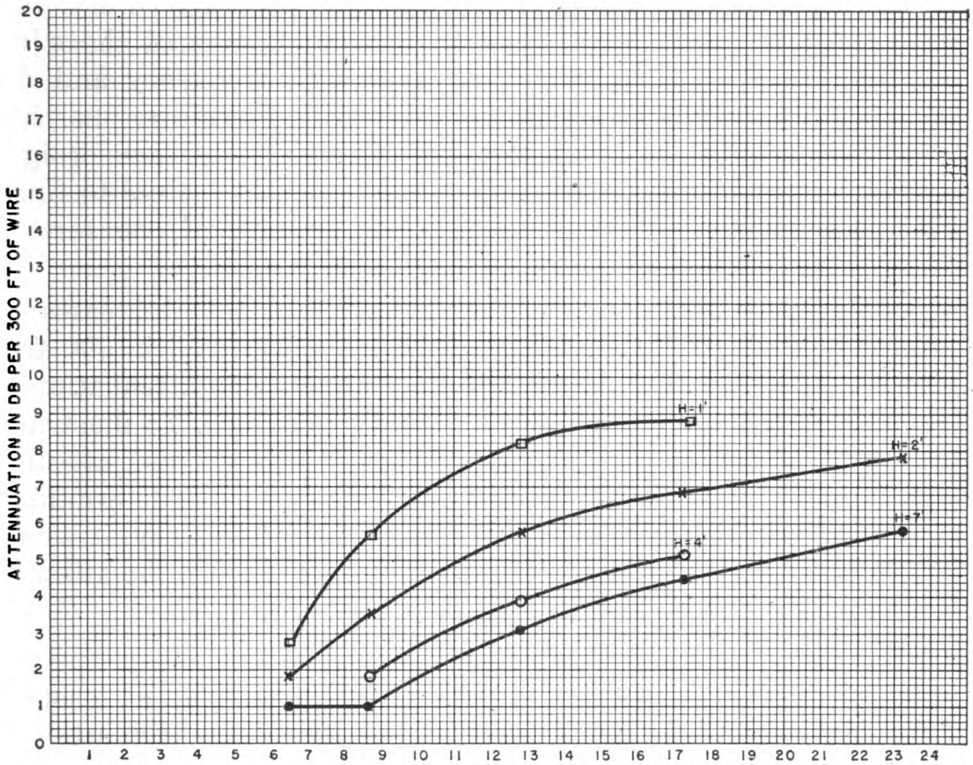


Figure 2.

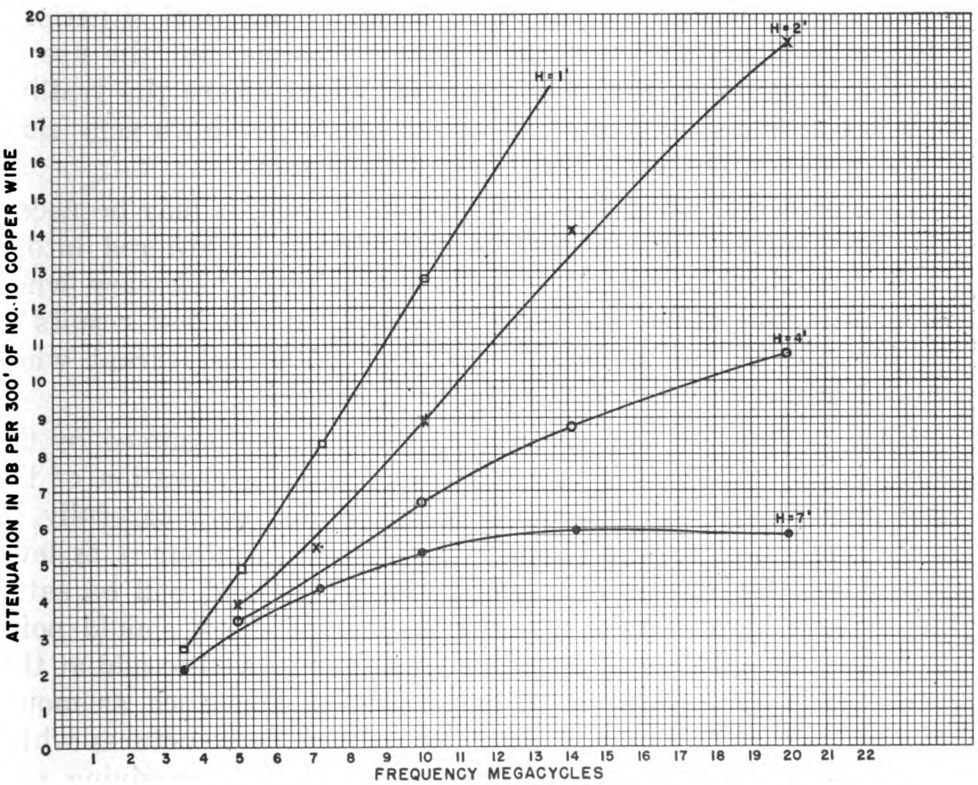


Figure 3.

In order that the trailing ends will act as proper terminations, there must be adequate attenuation in that portion of the wire, Attenuation per foot of wire increases with frequency and decreases with height above ground. We can, therefore, see that these factors must be taken into full consideration when designing the antenna. In practice, since the antenna is desired to function on a number of frequencies, a compromise of one sort or another must ordinarily be made.

Two graphs are shown covering two experimental cases at different locations. Attenuation in DB per one travel in 300 feet of wire is used as the basis; but since round trip attenuation is the important factor, the figures should be doubled. To illustrate, note that on one of the graphs, at 3 feet above ground, attenuation is approximately 2.5 DB per 300 feet. If we are determining the round trip that occurs in 600 feet of wire, let us say, it would be the equivalent of a single trip in 1200 feet. Hence, the attenuation is $\frac{1200 \times 2.5}{300} = 10$ DB.

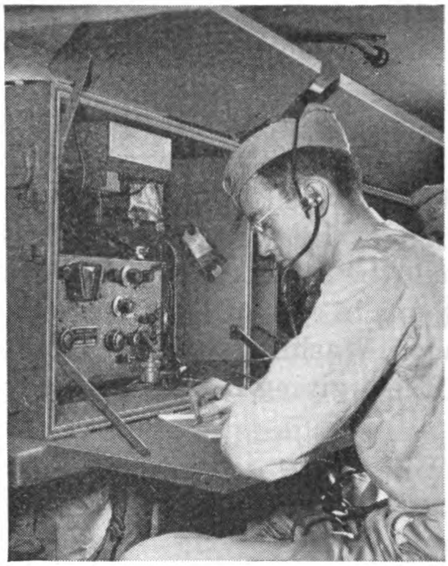
Round-trip attenuation in trailing ends should be at least 10 DB, and, whenever possible, much higher. To assure high attenuation, the wire must be hung so that the lowest point on the catenary (the curve formed by the hanging wire) falls between the apex and the far end. This is realized by the use of short poles 6 to 10 feet high at the far ends. In many practical situations. however, the method mentioned is not feasible, but the use of suitable weights at the points on the wires where the trailing ends are assumed to commence brings the wires down very close to the ground. The net effect is almost the same.

In some cases, when the first method is used, it may be necessary to allow the lowest part of the wire to be lowered into a ditch, though this method is seldom absolutely necessary when sufficiently long wires are used. Wire lengths, for best results in the inclined V, run between 1,200 and 1,500 feet except when limited to use entirely on the higher frequencies.

Since, as we now can see, the catenary curve assumed by the wires is important, it is essential to survey the elevation of the land upon which the antenna is to be erected very carefully. It is obviously best to select land whose ground contour is as level as possible. Uniformly and gently sloping ground will be satisfactory and in such a case, the open ends of the V should point down the slope. In choosing a site (it might be well to add at this point) it is also desirable to avoid obstructions such as mountains, buildings and other natural or man made structures which lie directionally in the path of transmission. For receiving pur-

poses it appears superfluous to say that the antenna should be located as remote as possible from man made radio interference.

As space does not permit, we will have to take up one of the most important factors in this type antenna, the included angle, in our next article. We would like to invite comment on this series of articles, whether good or bad. Also, if you have a special type antenna that would be of interest to the rest of the members, send the details to me in care of Headquarters, MARS-Army, room 5B519, the Pentagon, Washington 25, D. C.; and we would be very happy to publish them giving full credit to the member.



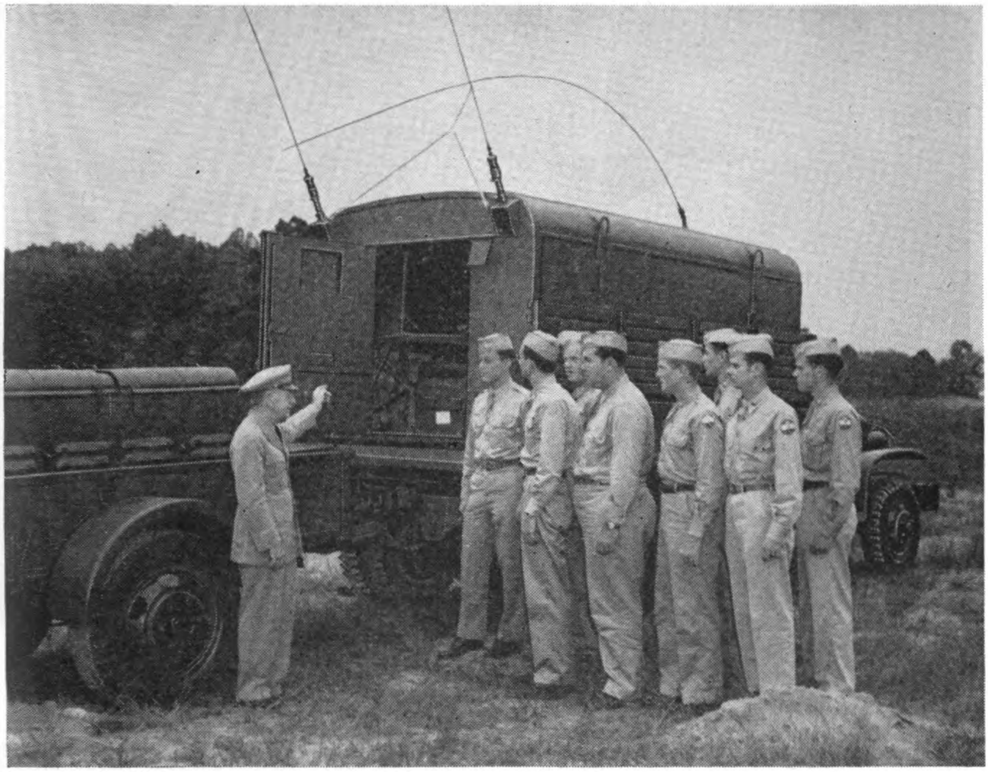
Cadet Lt. Jonathan W. Fulton, North Carolina State College.

CADETS USE MARS AS LABORATORY

ROTC cadets in various stages of communications training are shown on these pages. Mars offers cadets a practical outlet for amateur activity through affiliation with an organization devoted to promoting military radio communications and integrating the study and experimentation of professional communicators with the private findings and workbench efforts of radio hobbyists.

Mars offers ROTC units possessing an FCC licensed amateur station the following:

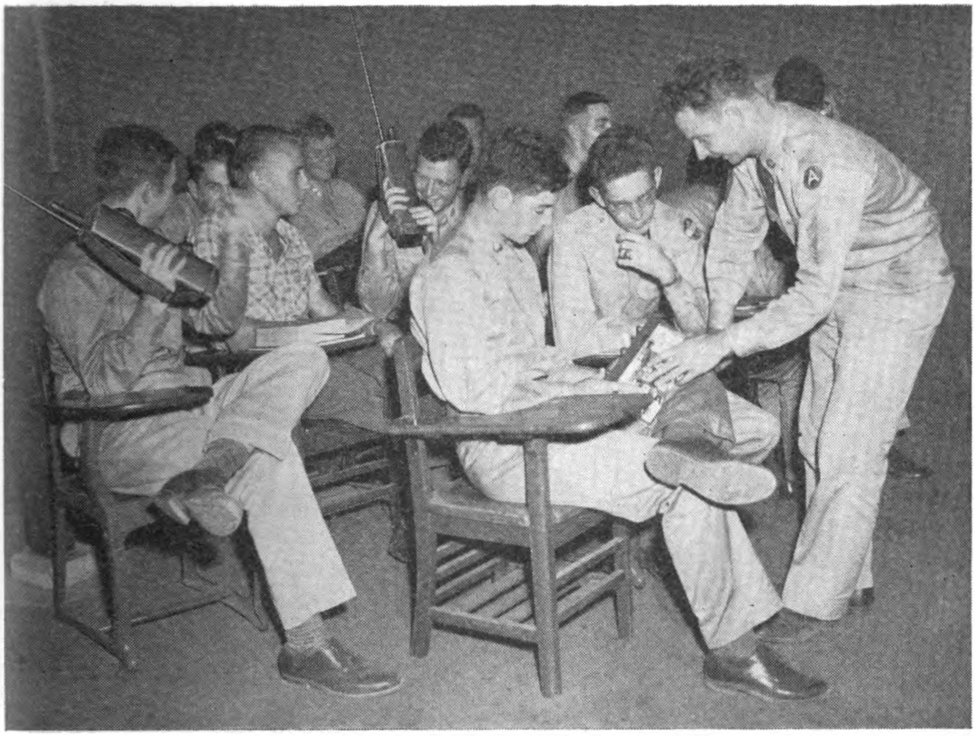
1. Membership in the joint Army-Air Force program.
2. Military frequencies on which to operate.
3. Crystals for operation on those frequencies.
4. Surplus gear excess to military requirements (available to Army units only on recommendation of Army Signal Officer).
5. Personal advice on technical matters pertaining to individual station construction and/or operation.
6. Affiliation with other amateurs and integration for disaster or emergency communications.
7. The Mars Bulletin.



Col. Samuel A. Gibson, head of the Military Department, North Carolina State College, explains the operation of a mobile radio station to a group of Signal Corps cadets.

Cadets at Alabama Polytechnic Institute study a BC 284 in Advanced Communication class.

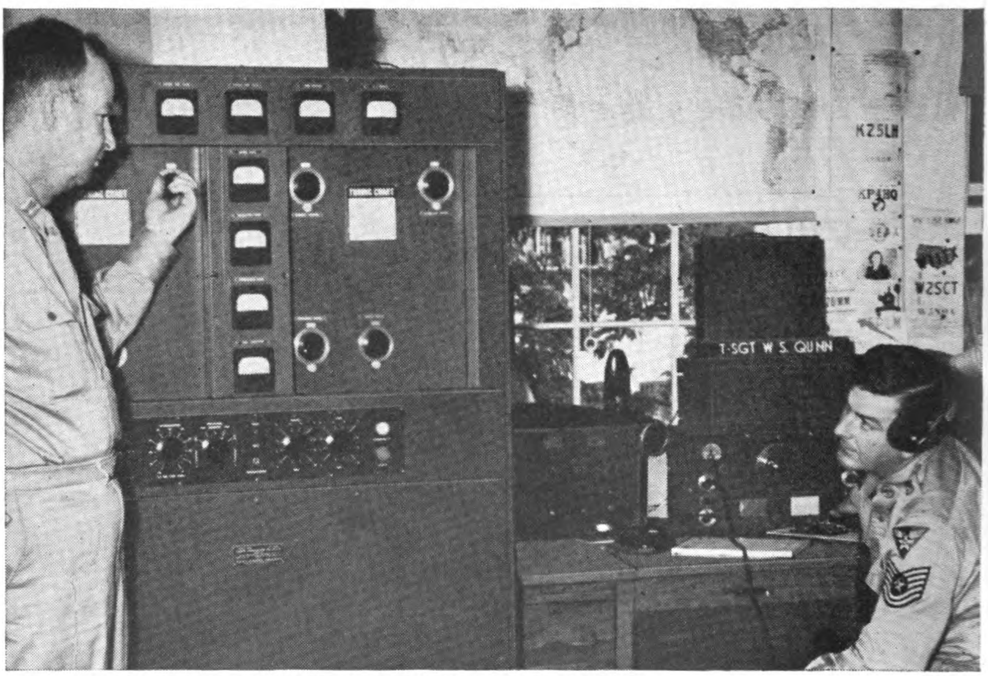
University of Maryland cadets are active in MARS nets. Above is shown the Cadet Campus Communications Center, while below is pictured a campus display of the ROTC SCR 399 mobile unit, operating during a Maryland Military Day demonstration.



ROTC Instructor, MSgt. Garretson, teaches the advanced communications class at Alabama Polytechnic Institute, Auburn, Ala.

Members of the Georgia Tech Amateur Radio Club are W4IRL, Capt. George Baldwin, and W4s NXT, GYA, JIW, and MIC.

Putting up the antenna for mobile operation is a three-man job.



Capt. Ira Ferguson and TSgt. T. S. Quinn operate A5PWV.

All eyes are on Capt. James A. Long as he cuts the birthday cake at Radio Station AB6USA.

— MARS BIRTHDAY —

HAWAII STYLE

KH6USA celebrated its first birthday anniversary with an Open House on 4 March 1950 from 1200 to 1800 hours at Fort Shafter, T. H.

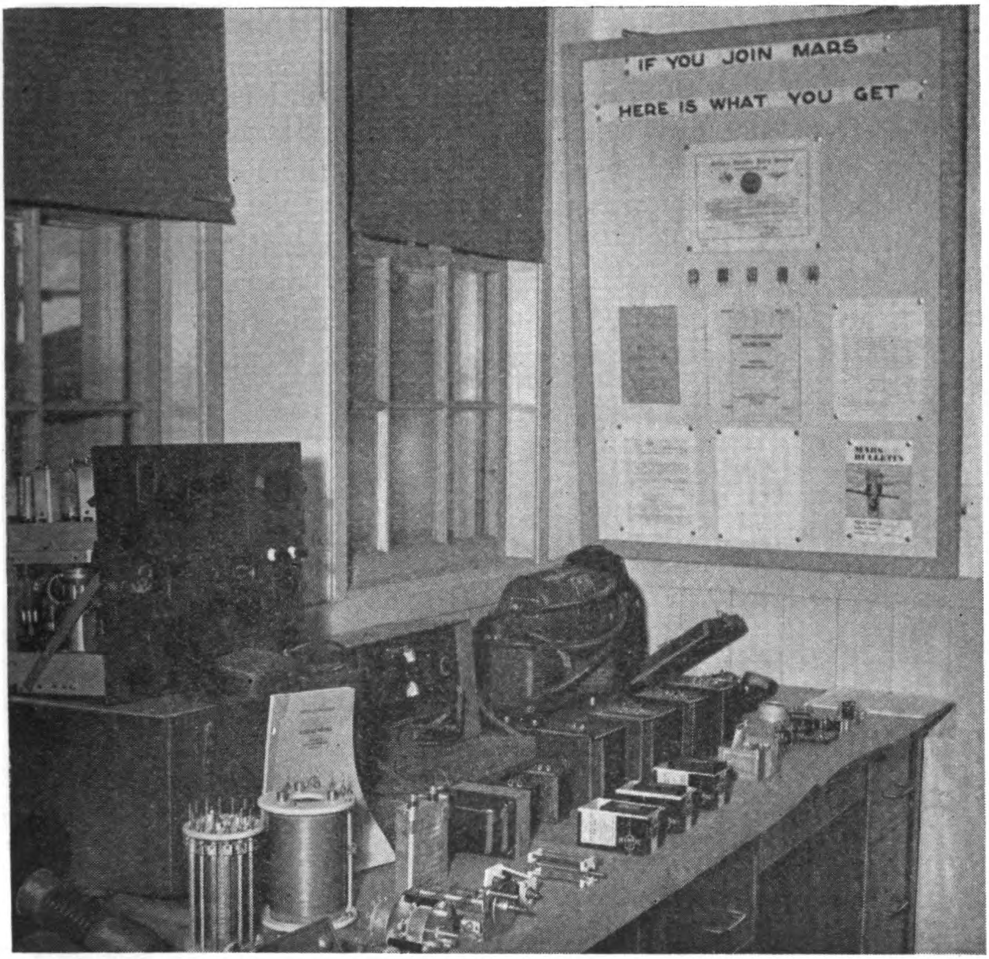
Approximately 70 persons visited the station during the 6-hour period. Numerous events during the celebration included a radio-teleprint demonstration, display of MARS equipment, movies, and refreshments.

KH6USA using its MARS call—AB6USA—made its first contact on radio-teleprint equipment with AB6UM, located about 25 miles north of Fort Shafter. The contact was made on 20994 kc using BC–610's and Super-Pros with a half-wave doublet antenna.

A display of some of the equipment available to MARS members was located at the entrance of the station. Included in the display were mobile equipment, power supply parts, maintenance parts, and copies of the various literature furnished by MARS.

A movie on frequency modulation brought the celebration to a close.

Above—First "birthday contact" was made by Maj. William S. Dawson, USAF.
Below—Guests of AB6USA enjoy refreshments as part of the birthday celebration.



This display greeted visitors to the AB6USA birthday party at Fort Shafter.

NEW RESISTOR

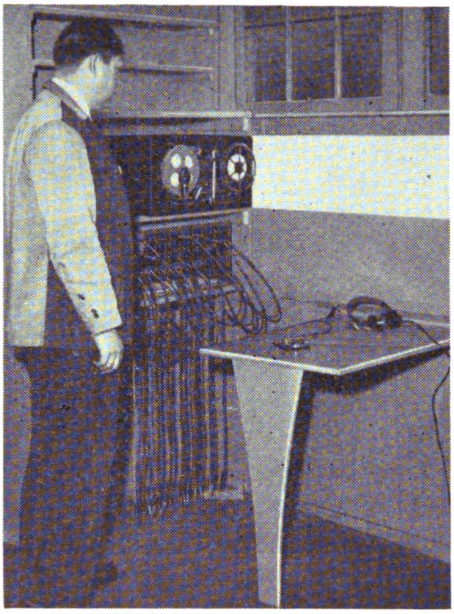
A new resistor has been developed by Continental Carbon Co. for use in applications requiring initial accuracy and stability. The resistor employs a noble metal film-resistant element and is protected by vitreous enamel and a high-temperature cover coat. It is rated at ½ watt in an ambient temperature of 85° C. Reduction in size and cost of the non-wire-wound unit is appreciable compared to the JAN–R–93 accurate, wire-wound type, especially in resistance values in the megohm region. Because of the numerous application possibilities for this resistor, it has been recommended for listing as a preferred item in the SCEL Preferred Parts Stock List. Some of the applications recommended are:

1. Substitute for accurate wire-wound type (JAN–R–93).
2. Substitute for all 1 percent and 2 percent composition matched pairs.
3. Substitute for all the low power wire-wound types (JAN–R–184).

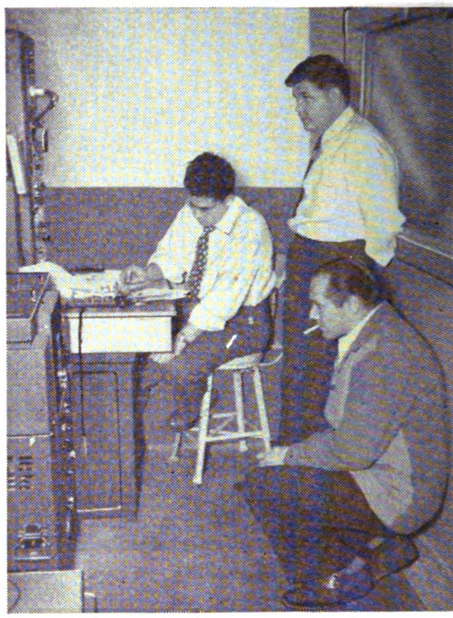
SIGNAL DEPOT HAM CLUB JOINS MARS

The club station of Baltimore Signal Depot has been licensed A3PGO for MARS operations. Lt. Leonard M. Havens, W3PGZ, is the station trustee and technical advisor to the club.

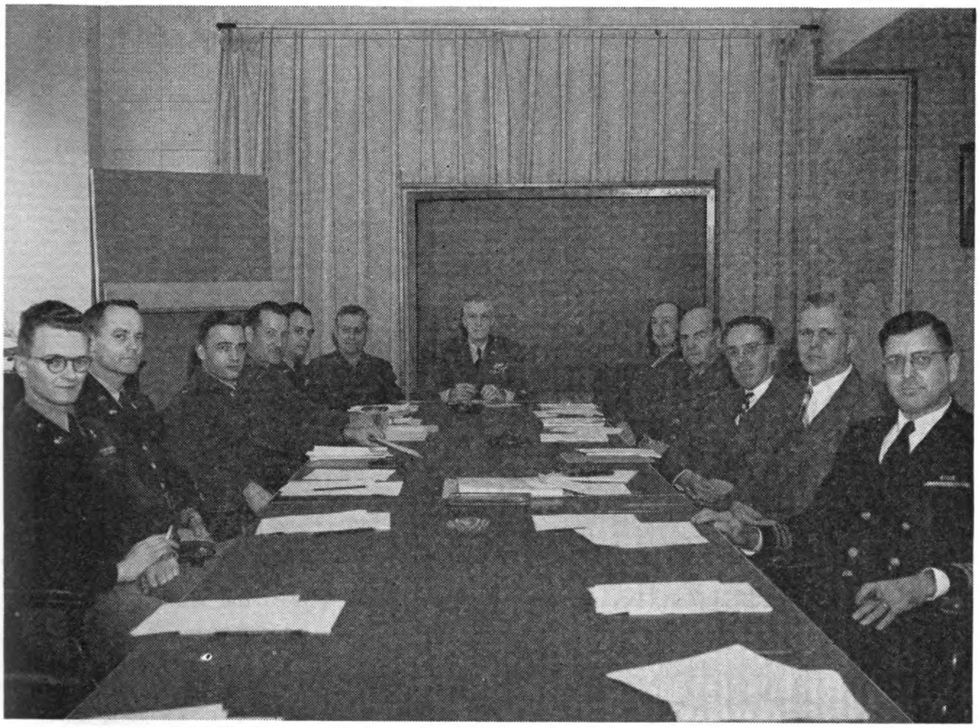
The Depot club was organized in January, 1949. The clubhouse now houses two BC–610 transmitters and operating consoles. A third transmitter is set up for two-meter operation. Regular classes are conducted in code practice and radio theory. The club publishes its own newspaper; Irene Nowicki is editor.



John Stokes at Automatic code keyer. Other Baltimore Signal Depot members are

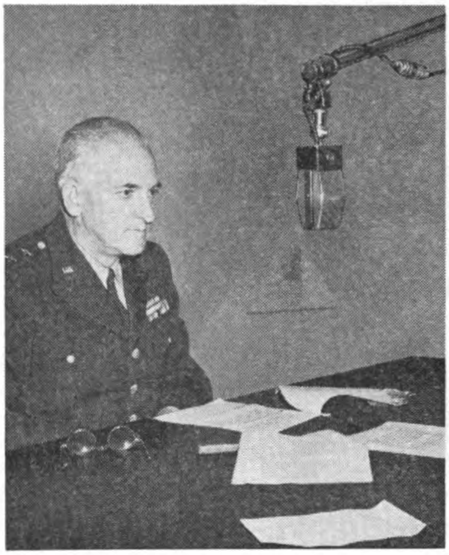


B. Custodero, left, and M. Keydash, right, shown with Stokes at A3PGO.



MARS ADVISORY COMMITTEE

Members and observers at a recent meeting of the MARS Advisory Committee, held at the Pentagon Building, Washington, D. C. Pictured from left to right: Maj. J. R. Carpenter, Signal Corps Plans and Operations; Lt. Col. W. O. Jefferson, Signal Corps Procurement and Distribution; Lt. Col. D. W. Eddy, Army Communications Service Division; Maj. R. H. Ralls, AF4RB/W4RB, Chief, MARS—Air Force; Capt. E. L. Nielsen, A4ODI/W4ODI, Chief, MARS—Army; Capt. Terrence Biggs, AF3KNZ/W3KNZ, Air Force Communications System Division; Col. A. B. Pitts, AF3BI/W3BI ,Civilian Defense Planning, Office of the Secretary of Defense; Brig. Gen. E. C. Lynch, AF4EMJ/W4EMJ, Chief, Air Force Organization Division; Maj. Gen. F. H. Griswold, AF4OTZ/W4OTZ, Air Force Assistant Deputy Chief of Staff for Matériel; Mr. F. E. Handy, AF1BDI/W1BDI, American Radio Relay League, Mr. R. W. Percy, Federal Communications Commission; and Comdr. E. L. Battey, W4IA, Acting Head Navy Reserve Liaison and Public Information Section, Naval Communications Division.



Maj. Gen. Kirke B. Lawton, Deputy Chief Signal Officer, "plugs" the Armed Forces Day Contest on ABC network show, "Time for Defense."

ANNOUNCE WINNERS IN FIRST ARMED FORCES DAY CONTEST

One hundred and forty-five station logs were received in the Armed Forces Day QSO-Message Relay Contest, co-sponsored by MARS and Navy on 20 May 1950. Two hundred and thirteen operators participated. In addition 220 persons successfully copied the "Greetings to Amateurs" broadcast at 25 w. p. m. over 13 military frequencies. This last group has been mailed "Certificates of Merit" signed by the Secretary of Defense, the Honorable Louis Johnson.

Special call stations—military stations—and ordinary amateur stations were graded separately, and each of the listings was further divided into single operator and multi-operator categories.

KG6DI rolled up a smashing score of 9371 with only two contacts; KG6DI and KG6GC operated the station. Since KG6DI specializes in traffic relay for the Pacific area, and because he was in a class all by himself, he was placed in a special category for grading.

W4KFC placed first in single-operator stations with a score of 239, working 43 stations and handling 94 messages. W2BPV scored 162 points on 43 contacts, using emergency power, and W4IA garnered 132 points on 84 contacts.

Individual station—multi-operator class was paced by W6ZZM with a score of 142. Operators were W50QY, W6HVE and W8FHF.

Raritan Valley Radio Club of New Jersey put a club station

into the contest, operated by W2CUI, CWK, CRB and LFI. They scored 142.

K4WBG, Fort Knox, Kentucky, operated by W4LEI and PUE, using emergency power, handled 419 messages and worked 11 stations. Other amateurs operating at Fort Knox were W4QDK, NFH, PVR, RHT, QBC, NOK, PBX, and ORC.

W3HCE, operating at W3USA at Fort George G. Meade, Md., scored 269 points, using emergency power and working 72 stations.

HIGHEST SINGLE-BAND SCORES

High scores in single-band operation:

3.5-mc CW—W8DAE, 53.
7-mc CW—K4NBF (W4MKO, opr.), 104; W8YEG, 93.
14-mc CW—W6ZB, 97.
3.85-mc phone—W4MCM, 32.
28-mc phone—KH6WAA (Cpl. D. L. Lynch, opr.), 47.
144-mc phone—W2BPV (aero-mobile), 162.

Sixty-six percent of those submitting logs used the 7-mc band; 46 percent operated on the 14-mc band for CW. Thirty-three percent used 3.5-mc CW; 15 percent used 28-mc phone; 14 percent used 3.85-mc phone. Four stations used 160 meters; one was active on 27 mc.

BRIG. GEN. WESLEY T. GUEST, ex 8KM; Chief of Army Communications Service Division (now Chief, Sig PEO Div.), personally "blue pencilled" the copy for the "Certificate of Merit."

Participants by Classes:
*—Emergency power—wholly
**—Emergency power—part time

SPECIAL CALL, MULTI-OPERATOR

SCORE	STATION	STATIONS WORKED	MSG HANDLED	OPERATORS
1688	K4WBG*	11	419	W4LEI, PUE
351	K2WAR	19	166	W2EWZ, HSA, UPI, ZXL
286	K6FNG*	62	37	W6AWU, DAR, DHO, DKE, EGO, JKW, KLB, MJM, MOM, TDK, ZHW
234	K6NRA	54	84	W6GYJ, TWT, VGJ, YCO, YLD, ZIL, ZSM
232	K6AIR**	100	46	W6CFQ, FAK, WET
194	K4FAG*	83	3	W4PYU, RDY, YET
172	K9NAC*	30	24	W8SWH, W9CGY, IDY, OSV, TEG, VUD,
147	KH6USA	97	21	KH6AAQ, ACB
142	KG6FAA*	41	11	W2BUZ, W4MXU, W5QWU
138	KØNRY*	47	7	WØDJE, SKF, TFW
128	K9NRD**	76	3	W9ACC, BUH, PQU, PWM, QWT, RPG, VSR
114	K8USN**	39	7	W8CDB, CHT, LZO, SHI
80	K9NAG**	30	2	W9DWD, IRO, PK
80	K8NRL*	30	1	W8CNC, DJN, W9BNK
77	K8NR**	32	18	W8BEZ, DSD, NEC
74	W3USN	54	6	W3EC, HGY, KIP, PGB
54	K3WAL**	27	2	W30EK, QAD
29	KØNAI	19	1	WØAEX, DKJ
26	K8WAF**	11	1	W8EXZ, TZC
23	K4USA	16	1	WØYPA, W4RGF
17	K9NAT**	10	0	W9FJT, HKB, JUI
12	K1NRS	6	3	W1DFS, OGW, W2UEI
5	K2NRG	5	0	W2DV, ZYO

SPECIAL CALL—SINGLE OPERATOR

SCORE	STATION	STATIONS WORKED	MSG HANDLED	OPERATOR
268	W3USA*	72	35	W3HCE
248	K5AIR*	46	35	W5QQR
212	K5NRJ*	41	28	W5PCL
177	K4WAL**	53	26	W4MSJ
145	K3NR	36	21	W3NFO
128	K9NR	48	40	W9AKP
124	W5USN*	50	2	W5RCZ
104	K4NBF*	36	4	W4MKO
102	W4USA	12	45	Sgt. B. J. DeCecco
84	K1NRE	46	15	W1QJM
83	K5NRS**	44	2	

SCORE	STATION	STATIONS WORKED	MSG HANDLED	OPERATORS
73	K5NRG	18	24	W5UPC
55	KØNRS	27	14	WØRKS
47	KH6WAA	31	4	Cpl. D. L. Lynch
46	KØWAD*	7	8	WØMFX
44	K6NAA**	14	5	W6FCX
40	K5NBL	30	1	W5PYU
35	W5USN	35	0	K9AAD
35	K8NRP	21	3	W8EJW
30	K5NRW*	6	1	
29	K8NRW	17	2	W8DLM
27	K9NRM	27	0	W9HCR
24	K2NRY	24	0	W2BPJ
20	K9NAI*	10	0	W9AMT
16	K9NAL	10	3	E. J. Sack
7	K3NRM	7	0	W3OOL
5	K8NRS	5	0	W8TCO
5	K1NRW	3	1	W1IIC

REGULAR-CALL, MULTI-OPERATOR

SCORE	STATION	STATIONS WORKED	MSG HANDLED	OPERATORS
142	W6ZZM	64	35	W5OQY, W6HVE, W8FHF
139	W2QW**	67	7	W2CUI, CWK, DRV, GPV, LFI
88	WØLHT*	36	4	WØLHT, MCY, TQT

REGULAR-CALL (ONE-OPERATOR)

SCORE	STATION	STATIONS WORKED	MSG HANDLED	
239	W4KFC	43	94	
162	W2BPV*	43	15	
132	W4IA	84	20	
111	W1SOT	51	26	
109	KH6ACS	87	7	
97	W6ZB	29	30	
93	W8YEG	38	23	
92	WØDYX	40	22	
92	KH6AAY	54	15	
88	W5RHA*	20	8	
87	W4CYC	25	27	
87	W9BVG	33	23	
84	W6DTY	30	23	
83	W1YBV	27	23	
80	WØELT	34	19	
71	W5OZI	37	13	
70	W3OFU	30	20	
70	JA2HQ*	23	2	(Cpl. R. E. Thomas, Opr.)
68	KL7WC*	16	5	
66	W4ILP	20	19	
66	W2PQG*	21	2	
64	W2CDJ	34	11	
63	K2CC	43	6	
60	W1BDI**	17	11	

SCORE	STATION	STATIONS WORKED	MSG HANDLED	
60	W1RDD	20	16	
55	WØKRV	15	20	
55	W9FXA	27	10	
54	W7DXV*	9	5	
53	W8DAE	13	16	
52	W1JYH	50	1	
51	W8ZWM	33	5	
51	W9EBX**	8	16	
50	W5OM	32	5	
50	W2GFG**	38	2	
48	W6ZG	34	3	
47	W6GYH	9	19	
42	W3IJ*	21	0	
40	W3OCU	18	7	
38	W8UJN	18	10	
38	W7DP	28	1	
32	KH6FX	12	6	
32	W4MCM	6	9	
32	W3EAN	18	7	
31	W3ECP**	7	5	
29	WØGVW	11	5	
29	W5ZU	13	4	
28	WØASO	16	2	
28	W4PEC	18	1	
27	W2AUF	11	5	
27	W6CIS	7	6	
27	W5CA	17	1	
25	W2RSE	11	3	
25	W1LYL	15	1	
25	W4PRL	7	5	
21	W9WIO	15	3	
21	WØMYB	11	1	
21	W4IQR	5	4	
21	W1AW	3	5	(W1RUP Opr.)
20	W8AL**	13	3	
18	W5HFB	8	1	
18	W9IML	8	1	
17	W4NTR	17	0	(W4PJM Opr.)
15	W3QS	15	0	
15	W2AHN	13	1	
15	W1BDV	5	1	
14	W2PHO	8	3	
14	W8DSE	2	2	
14	W8DNB	6	4	
14	W2VYB	12	1	
12	W3MSU	10	1	
12	W2LGK	12	0	
11	W4EDA	7	2	
11	W2KVG	11	0	
9	W6DVD	5	2	
9	W2PF	9	0	
9	W7MID	5	2	
8	W2ESM**	6	0	

SCORE	STATION	STATIONS WORKED	MSG HANDLED
7	W2VL	7	0
7	W7VO	3	2
6	W6IXH	6	0
6	KH6CD	6	0
5	W1AHN	5	0
5	W6FYW	5	0
5	W2VDL	5	0
3	W6ISX	3	0
3	W8IAM	3	0
3	W1IIC	3	0
3	W5QWK	3	0
1	W2TUK	1	0
1	WØNIY	1	0

The following have received Certificates of Merit signed by the Secretary of Defense, the Honorable Louis Johnson, attesting to their proficiency in copying a 25 w. p. m. Armed Forces Day "Greeting to Amateurs."

W1AMQ, BB, BDI, IIB, OKX, QJM, QMJ, RFW, RYZ, SRM.

W2ALZ, ARO, AYG, BZJ, CJI, CLL, CSQ, DRV, ELR, GFG, HAZ, HJX, KHA, KVG, LCK, LEL, OBU, OCW, PFB, QHB, RSE, VWK, WCE, WH, WVC WVE, ZI.

W3ADE, CLY, DXK, EC, ECP, KGQ, KIP, LYN, MCG, OFU, OKS, PWI, QAC, QCB, QEU, ZJ.

W4FXG, IZG, KJ, MLH, NTR, ODA, OXX, PEC, PHM, SR.

W5AHT, CA, DHH, EGX, FIW, GFL, HBZ, JPC, MSX, NIY, OCK, OFH, OJ, OM, OQY, PCL, REQ, ROO, TH.

W6AUP, BSP, BZQ, CGJ, CIS, CQP, DTY, DVD, FYW, GMP, GYH, GZS, HVE, IAW, ICM, IEI, ISX, IW, MVF, PMQ, TZK, VJD, ZB, ZG, ZSM, ZYM.

W7BDL, BVZ, BWD, CZY, DIS, HBO, HRM, LKZ/6, NEI, NGW, NSM, NUN, VO.

W8AQ, ERD, FLA, RKV, VZ, YCP, YOT, ZZU.

W9AKP, BPS, CHV, ERW, FSN, FSU, HID, HXV, IWT, JTX, MNR, RCB, TT, UBW, VUD.

WØAIR, ASO, BBL, BHA, DJE, EA, FID, FTJ, MYB, QVA, TDH.

AE3US, KG4AK, KG6DI, KH6FX, KH6LE, KP4IQ, KP4KD, KZ5PA, VE6RX.

James W. Addison, East St. Louis, Ill.; Thomas D. Bailey, c/o Furness Withy & Co. Ltd., New York, N. Y.; Daniel T. Baird, Marconi Drive & Robert E. Lee Blvd., New Orleans, La.; Nolan W. Baird, New York, N .Y.; Robert Allen Baker, New London, Conn.; Irvin W. Baldessari, Washington, D. C.; L. I. Bealmear, Stillwater, Okla.; Alexander Borodenco, Kingston, Pa.; Francis J. Bradley, New Orleans, La.; John E. Brunner, APO 403, c/o PM, New York, N. Y.; W. M. Buchanan, West Des Moines, Iowa; William J. Beetham, Fennimore, Wis.; Arthur J. Behling, U. S. Naval Reserve Training Center, Milwaukee, Wis.; John H. Bennett, Sr., Staten Island, N. Y.; George R. Berg, Santa Barbara, Calif.; George M. Berkley, Johnstown, Pa.; John A. Busby, Macon, Ga.; William E. Christian, Jr., Nixon, N. J.; Jesse W. Clary, Macon, Ga.

T. Verne Corbin, Delevan, Calif.; John W. Cummings, Houston, Tex.; John C. Currie, Arlington, Va.; Harry James Dannals, Hempstead, N. Y.;

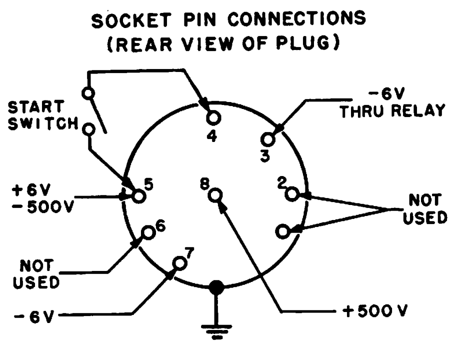
A. G. Davis, Des Moines, Iowa; R. G. Edwards, New Orleans, La.; Richard J. Freitas, c/o Fleet Post Office, San Francisco, Calif.; Robert L. Fulks, Macon, Ga.; Thomas Galbreath, San Angelo, Tex.; Delone C. Gause, Cheltenham, Md.; Rodney Earl Gott, Waterloo, Iowa; Herman Greve, Hilbert, Wis.; Lawrence H. Hammond, Des Moines, Iowa; Arthur C. Harman, APO 403, c/o PM, New York, N. Y.; C. F. Harshfield, Des Moines, Iowa; E. A. Hawkins, Moline, Ill.; Harvey L. Haysler, Webb City, Mo.; R. E. Hillyard, Bremerton, Wash.;

John J. Jenkins, Lemongrove, Calif.; Richard A. Johnson, Elmira, N. Y.; W. A. Koepke, Jr., New Orleans, La.; Leslie H. Ladd, Waterloo, Iowa; Harold Lee, Santa Barbara, Calif.; Robert E. Lee, Santa Barbara, Calif.; W. R. Lighthart, Waterloo, Iowa; Theodore C. Lindquist, Canoga Park, Calif.; Henry Dean McClintock, Johnstown, Pa.; E. F. Merritt, Jr., Rye, N. Y.; Ray E. Morrison, Skokie, Ill.; C. E. Morrow, c/o Fleet Post Office, New York, N. Y.;

H. P. Pierce, Waterloo, Iowa; H. H. Plumeau, Santa Barbara, Calif.; J. G. Putnam, Curry, Alaska; John J. Rainey, Fort Niagara, N. Y.; William H. Rekemeyer, Cambridge, Mass.; John Francis Richards, Washington, D. C.; Robert Richardson, Fort George G. Meade, Md.; Olen T. Robinson, Macon, Ga.; W. F. Rodgers, Jr., Pittsburgh, Pa.; Howard B. Rogers, Jr., Raleigh, N. C.; R. G. Schneider, c/o Fleet Post Office, New York, N. Y.; J. P. Schumaker, Moline, Ill.; Edward C. Shanks, New York, N. Y.; Samuel L. Shelby, Springfield, Mo.; C. E. Simonson, Kingston, Pa.; Kenneth D. Tomkinson, Riverhead, N. Y.; M. Weber, Cincinnati, Ohio; Byron Wilmot, Ithaca, N. Y.; Donald S. Winslow, Waterville, Me.; D. P. Wyatt, Jr., Macon, Ga.; Jack L. Young, Topeka, Kan.; E. C. Zindars, Madison, Wis.

LET'S GO MOBILE WITH A PE 103A FOR POWER

By James T. Conner, A3HCE



The PE 103 dynamotor will deliver 160 MA at 500 volts from either 6 or 12 volts input. The battery drain when used on 6 volts is aproximately 22 amps and when used with 12 volts it is approximately 11 amps. (This assumes that the full load of 160 MA is being drawn.) Under no load conditions the battery drain is approximately 5 amps. Actually the unit will deliver much more than it is rated for.

The lower housing of the unit contains filter components and circuit breakers for overload protection as follows:

Right, 40 amps (dynamo primary overload).
Center, 0.22 amps (high voltage overload).
Left, 7.5 amps (control and filaments overload).

A switch located on top of the housing under a protective cap can be set for either 6 or 12 volt operation.

The pin connections are as follows: (The plug where you find 8 pins, 4 on one side, 3 on the other, and 1 in the center.)

1. Not used.
2. Not used.
3. Negative 6 volts through relay.
4. Start coil.
5. Common, positive 6 volts and negative 500 volts.
6. Not used.
7. Negative 6 volts.
8. Positive 500 volts. (This is center pin.)

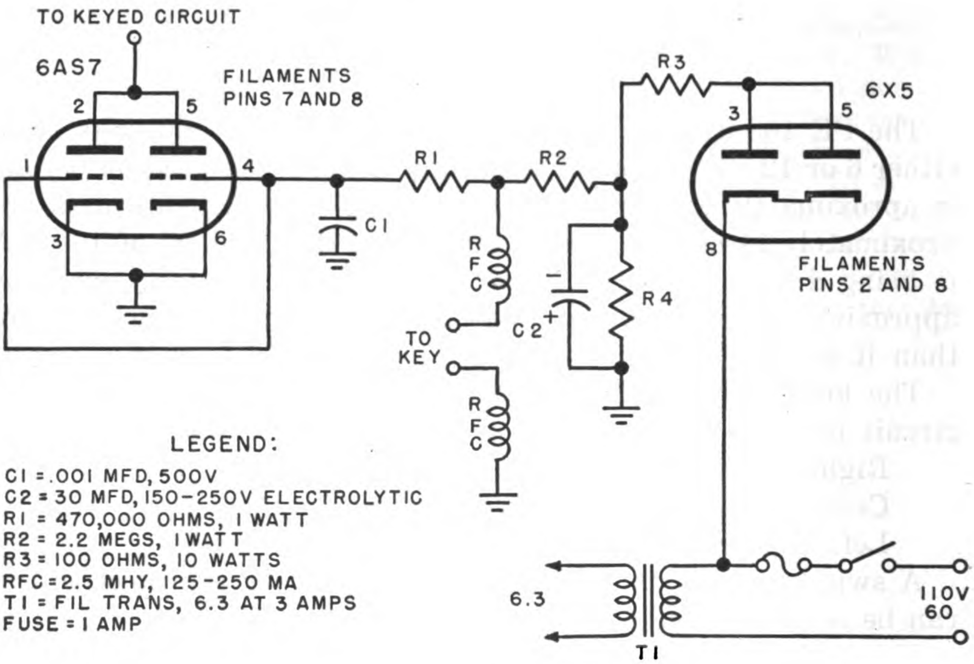
For typical operation using 6 volt battery with positive ground; (1) connect terminal 5 to ground; (2) turn switch on top to 6 volts position; (3) start dynamotor by connecting terminal 4 to ground; (4) "A" minus will appear at terminal 3—"A" plus is ground; (5) "B" plus will appear at terminal 8—"B" minus is ground.

CONNECTIONS FOR 225 VOLTS AT 80 MA

By connecting the armature for 12 volts and actually running it on 6 volts, and running the 6-volt fields direct from the battery, the no load current is 3 amps. This gives an output of 255 volts at 80 MA, but under loaded conditions the drain is only about 7 amps. This provides excellent efficiency, and by throwing the 12 volt/6 volt switch, power may be stepped up.

CUT AND TRY

MEISSNER KEYING UNIT



Here is a diagram for a keying unit to be used in conjunction with an oscillator. At present I am using it with the Meissner Signal Shifter and the oscillator is being keyed in the cathode circuit. The reports are all T9, T9X, while without it reports range T8 and chirpy.

This idea is not mine, but belongs to W6BLZ. However, I send it on in the expectation that other MARS members may profit from it as I have. The unit is contained in a metal box 5 inches deep by 4 inches high and 3 inches wide. It is mounted on the VFO (the corrugated sides of the VFO make this type of mounting easy and provides a short lead to the keying jack in the rear of the VFO).

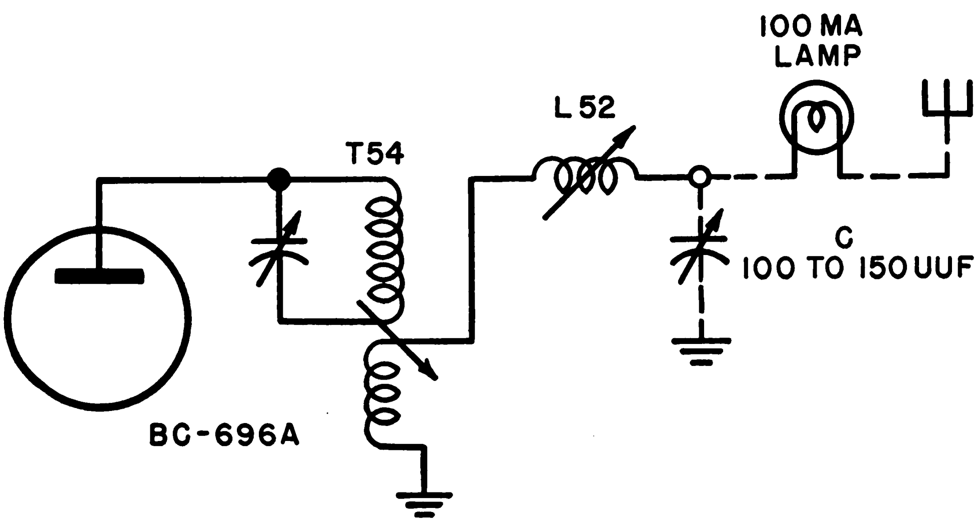
Let me urge strongly that the keyer and the VFO be grounded either to a water pipe or to a stake driven at least 8 feet into the

ground. If you dont; if the keyer and VFO are "floating" and you should then touch ground and the chassis—that's all, brother, you've had it.

LEONARD M. MACOMBER, A9RAU

COMMAND TRANSMITTERS

Owners of the ARC 5 and SCR 274 series command transmitters may be interested in the following modification in the antenna loading circuit which seems to load over a wider range of frequencies and antenna lengths than the original circuit and uses only the built-in loading coil:



C, a condenser of 100 to 150 MMF has its rotor bolted to the case of the transmitter and the stator connected to the antenna post. The LC ratio of L52 and C is adjusted for maximum indication on the 100-mill lamp. Watch out, boys, with a 125-foot wire antenna, that 100-mill lamp will burn out at some frequencies.

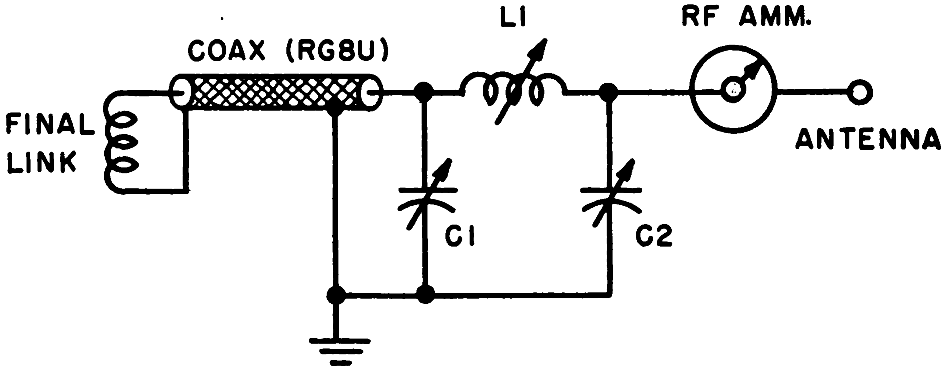
The above arrangement may result in as much as a 25-percent increase in loading on some frequencies over the use of the loading coil alone.

A. M. LEAKE, A4BCI

"PI NETWORK" ANTENNA TUNING

The use of the old "pi network" for antenna tuning is revived at my station for two primary purposes. First, the use of separate dipoles is impractical. I have neither the space nor the time

to erect this type of antenna for frequencies from 2 mc to 7 mc. Instead, I use a single wire, presently 100 feet long, but sometimes as short as 50 feet for an antenna for the above mentioned frequencies. I couple this to my transmitter through the coupler to a standard three-turn link in my final. Second, since I live in a TV fringe area, I have added also a low pass filter at the link; and since the co-ax from the link to the coupler is 52 ohms, I get a good match and a reasonably low standing wave ratio.



Pi Coupler.

L1 in the diagram is a rotary coil which was removed from the antenna tuning unit of a BC610 transmitter. There are three coils in the unit; this is the medium sized one. Actually any rotary coil will work, but this one was selected because it is capable of handling up to a KW with ease.

C1 in my installation is a 50 MMF variable and C2 is a 240 MMF variable condenser.

The value of C1 will depend largely upon the co-ax used and the length of this co-ax. Double spaced condensers may be used since, under normal tuning operations, low voltage is present across the condensers.

It is suggested that some form of RF indication be inserted in series with the antenna lead since it is possible to tune the arrangement so that it will act as a dummy load. Tuning is quite sharp and some practice in tuning may be required; once the settings are found it is a simple matter to change from band to band and this can be done in a few seconds.

The small amount of time consumed in construction of this device is well worth it to me since tests have shown that my second and third harmonics are inaudible a half-mile from my sending location. Incidentally, this is with the transmitter running 650 watts input. I have no TVI, but this is partially due to the addition of the low pass filter.

Arthur R. O'Neil, A9PDS

MARS YL STORIETTE

ETHEL SMITH, A3MSU.

MARS YL, A3MSU, is a 35 w. p. m. operator, active on 3.5, 7- and 14-mc CW with a 6L6–6L6 and a pair of 809's running about 125 watts.

The full name is Ethel Mae Smith, and as you see above, she is a WAVE in the Naval Reserve Electronics Program; her company is W–1, Washington, D. C.

MSU, former W7FWB of Wenatchee, Washington, is remembered in ham circles as founder of the YLRL; she was also a member of the prewar AARS. Ethel is now employed as an Engineering Aide at the Naval Research Laboratory in Washington. She lists hobbies, other than hamming, as motion picture photography and oil painting.

BEAMED OUR WAY

Berkeley, California

. . . Let's have more articles of the Al Hart variety. How about some pix of ROTC MARS Stations?

73

George M. W. Badger, A6RXW

O. K., George, this issue contains some of your ROTC units. It's up to you to help us get the others on the ball and submit pix and stories.

R. D. 3, Quakertown, Pennsylvania

. . . Believe Bulletin is good medium through which information can be swapped by MARS fraternity.I hope to see a lot of technical data, especially on the V. H. F. Suggest a "Letter to the Editor" column—it would give a guy a chance to blow steam at the rest of the gang.

John Specialny, Jr., A3HIX

Bellevue, Washington

. . . I particularly liked the propagation data; would like to see some information on single sideband in future issues.

George L. Buck, Jr., A7BSD

Hartford, Connecticut
February 10, 1950

To Military Amateur Radio System:

I am attaching a copy of Captain Duke's letter for any possible use.

73,

F. E. Handy, AF1BDI

"My station ZD1BD, Royal Signals, Freetown, will continue to operate on 10 and 20 meters during 1950 and I hope to contact MARS stations in the U.S.A. with a view to exchange technical data and, as necessary, make tests with NBFM and VHF transmissions. If possible, would you be so kind as to make this known to any MARS stations in your vicinity. Details of my operating time, etc. are:

10 meters (NBFM)—1500–1900 GMT daily.

20 meters (AM)—1900–2200 GMT daily except Fridays.

TX—200 watts.

Antenna—10 meters—3 el C.S. Beam; 20 meters—half-wave dipole.

Frequency—10 meters—28.3 mcs. (VFO); 20 meters—14395 kc. (VFO).

I have a list of some of the MARS boys and am watching for them.

With many thanks for your kind cooperation in the past and all good wishes to your staff for 1950. I am,

Yours sincerely,
Basil Duke, Captain
Royal Signals
Freetown, West Africa

At the risk of sounding repetitious, we'd like to say that all efforts are being made to change the membership rules so that the many non-military hams, and especially the host of former AARS members, can become eligible for MARS.

Saginaw, Michigan

. . . FB! Even the XYL commented that the MARS Bulletin was put up in fine form. I like the MARS spirit that makes military rank immaterial; let's keep it that way. Would like to see an article in a near issue on TV and TVI.

73

Clarence C. Feightner, A8EHF

San Diego, California

. . . Like the "Swing 'Round The Circuit" feature. Looking forward with interest to the Cut and Try section; maybe I'll be able to furnish a contribution from time to time.

Charles P. Weber, A6BCV

Brooks Air Force Base, Texas

. . . If anything will bring Martians together in their efforts, the Bulletin will do it. You asked for criticisms. I offer mine, based upon observation and conversation with many MARS members. Quite frankly, the only trouble I've been able to find is the responsibility at command levels. Wherever directors have been appointed who are non-ham, the tendency has been to regard MARS as just one of those annoying "additional duties." Genuine enthusiasm for the program will always fall short if the Director has it rammed down his throat or if the chief operator at a net control station is more or less coerced into performing his duties.

. . . Hope to see soon a concerted effort to organize something in MARS for the "workbench ham," a category into which many fall, including myself.

73

Oakley L. Stockton, AF5RHA

Palo Alto, California

. . . I hope you continue the "informal" type of article and picture arrangements and that discussions do not get too technical. Most of the technical material can be gained from the Amateur Handbook or some Manual. I'd like some "down to earth" discussions on how to rebuild surplus equipment, or how about portable operation—plus diagrams. MARS is fun, but as a working man, I have only a limited time to devote to it. I work 40 meter CW almost exclusively. Load me up with that kind of information.

Best of 73's,

Richard W. Keusink, A6BSJ

Phoenix, Arizona

. . . I would like to see more antenna articles and especially some information petaining to antenna tuners of various types and a discussion of their respective merits.

Rich Hulse, A7RFE

. . . I especially like the idea of presenting news by photographs. Photos and descriptions of MARS stations which can operate on the various bands from 2 to 28 mc should prove interesting reading. I trust funds will permit a continuance of the format in the future.

Very 73,
David Talley, A2PF

. . . Have no criticism at all of the Bulletin. I only hope that it will get thicker as each issue comes out. It would be mighty nice to know how the nets are progressing, and what difficulties they have run into and how they were overcome. I'm still hoping that in the near future membership will be opened to non-military men. In our own case with the North Texas Net we probably will not ever get much attendance until the good old time CW operators can be made MARS members. There are plenty of good men available who want to become MARS members but who cannot under the present set-up.

73
William F. Bonnell, A5CVW

This photograph was taken from a small boat offshore in Raritan Bay early in the morning, 20 May 1950. Shells and mines were still exploding in the vicinity.

FIRST ARMY

Residents of South Amboy, New Jersey, will not soon forget the heroic deeds of First Army MARS members as they worked, with other amateurs of the New Jersey, New York Metropolitan area to restore communications during the awful night of 19 May 1950.

At 1925 EDT a terrific explosion rocked the South Amboy area as ammunition barges being loaded from the Pennsylvania Railroad Terminus at South Amboy blew up in Raritan Bay. Thirty-three persons were killed, more than 300 injured as live anti-personnel and anti-tank mines, and 37 mm shells were strewn throughout the city. Communications were blotted out completely. From Fort Monmouth two SCR 339's were dispatched to the area along with several hundred troops for guard and aid duty. Radio contact was maintained from the mobile units with Fort Monmouth, First Army Headquarters in New York, and the Pentagon Building in Washington, D. C. Circuits operated until 20/0400 EDT, when nets were secured.

The 9th Infantry Regiment, New Jersey National Guard, was alerted and moved into the area. They reported into the MARS net using tactical equipment and call signs.

From the street just outside A2USA, First Army Headquarters Station, Sergeant first class Leslie C. Hindman, A2USA, contacted South Amboy amateurs using the 10 meter mobile rig in his car. Traffic on this net was passed to A2USA for retransmission by radio and/or telephone as required.

Stations participating included: A2BX, CDJ, CSM, TRN, UMB, WDK, MON, USA, UYA and W2AIU, CQD/pt, DLP/pt, EFA, GX, GYC, HUZ, PAT, PCX, PFL, PQG, TH, UOU, VBL, ZWN.

Capt. Michael Pickup, Maryland Director, Lt. Robert Richardson (A3NHB) and Capt. Richard Jeffrey (A8GDC) at the 2 A conference registration table.

SECOND ARMY

MARS Directors of Second Army met in April at Fort George G. Meade, for a 1-day conference on Second Army MARS problems. Delegates representing Regular Army, National Guard, U. S. Army Reserves were present from Ohio, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, and the Military District of Washington.

The directors decided to—

adopt a staggered-hour system of net operation to diversify operating hours and days.

activate on daytime schedule each week for those unable to meet evening schedules.

advance 2300 hour schedules in daylight time areas.

make a comprehensive study of location and capabilities of MARS stations which can operate on emergency power.

Delegates and observers to the conference included A3NHB, RYW, ECP, WR, NT, ANK, OVG, HCE; A4MO, FJ, KIL, KSD, NGX, ODI; A8GDC, CLS; and Maj. Maurice W. O'Conner, District of Columbia Reserve Affairs; Capt. Robert W. Salling, Kentucky National Guard; Second Lieutenant Kenneth W. Russel, District of Columbia National Guard; Capt. Michael B. Pickup, Maryland Director; Capt. William M. Peterson, Maryland National Guard; Lt. Robert N. Maxwell, Ohio National Guard; Maj. Samuel S. Kale, Eastern Pennsylvania Director, Lt. Charles Beattie, Pennsylvania Director; Capt. Cameron B. Patchell, West Virgina National Guard Director; and Capt. Jack Doherty, Virginia Director.

A Kentucky council of amateur radio clubs has been proposed in a meeting of five Kentucky amateur radio clubs who met recently at Buell Armory at the University of Kentucky. The discussion was directed by A4WAV trustee Lt. Col. R. H. McAteer.

The meeting was called by Dr. Asa W. Adkins, W4KWO, SCM of ARRL for Kentucky. Clubs represented were from Hazard, Ashland, Louisville, and two from Lexington.

THIRD ARMY

To help overcome the personnel shortage and to help disseminate training material to the field, MARS in Third Army has been placed in with Plans and Training Section, Third Army. A Third Army Bulletin has been started, a monthly publication designed to supplement weekly broadcasts and net operation. Supply problems, heretofore an administrative headache, are beginning to smooth out. Biggest problem now, next to lack of administrative help, is the frequency situation, according to Major Lambeth, Third Army MARS Director. Lieutenant Fowler, USAR, has been working on a network revision, while on a tour of active duty with Third Army Headquarters. It seems that Third Army nets have been unable to use 3497.5 kc because of interference. For the benefit of all MARS stations, repeated inter-

ference should be reported to: Commanding General, Third Army, Fort McPherson, Georgia, ATTN: Signal Officer for MARS Director. Reports should list—

1. Frequency interfered with.
2. Frequency of interfering station.
3. Call sign of interfering station.
4. Type of emission.
5. QSO and QRK reports.
6. Time of interference.
7. Extracts of interfering station transmissions.

FOURTH ARMY

Things are in great turmoil at Fourth Army Headquarters, according to Captain Wood, MARS Command Director. A5USA is moving to a new location on the post of Fort Sam Houston—better quarters, more antenna room, etc. Col. Carl H. Hatch, A5QVE, new Signal Officer, Fourth Army, is expected to really keep things humming MARS-wise. Here again Plans and Training is coordinating MARS activities in the field. Captain Wood, a private pilot with his own personal plane, looks forward to going aerial mobile as soon as he gets back the class A ticket he let expire during the war.

Fourth Army is planning great things for the fall activity. One idea they are cooking up down there is a SWAP program open to all MARS members designed to get components into hands where they will be used to get a rig on the air, and to further the spirit of friendly cooperation between amateurs.

FIFTH ARMY

Fifth Army MARS echoes a thunderous second to the Third Army complaint of interference on 3497.5 kc. The two armies share the frequency, so someone should be able to build a complete story on interference for the record.

Maj. Spencer Allen, Signal Corps USAR, A9JGL, was on a tour of active duty with Fifth Army Headquarters during June, 1950, and made a comprehensive study of MARS administration and operation. Details have not been released by Fifth Army Headquarters yet, but it is anticipated that in view of JGL's background as an active MARS member, and his public relations knowledge (he is director of the WGN—TV, Chicago Television Newsreel), his recommendations will launch a new drive for increased network participation.

MARS members at South Bend, Ind., deserve a pat on the back

for their fine job in directing South Bend's first radio controlled parade. MARTIANS and other members of the Michiana Amateur Radio Club, Inc., combined their efforts and equipment to furnish 10 meter mobile radio communications along the parade route and at the assembly points.

Parade chairman, John A. Scott, Major, USMCR, and Parade marshall, Police Captain Clem Hazinski, commented on the "efficiency and dispatch" with which parade communications were handled.

The club station set up for business at the reviewing stand as NCS. Six mobile units were attached to the parade's six divisions; one station was assigned to the parade marshall, and another fixed station was located at the court house where the principal address of the day was delivered.

Brig. Gen. Fay B. Prickett, Deputy, the Inspector General, USA, the reviewing officer and guest speaker, complimented the hams on their "military like" operation.

SIXTH ARMY

Members in Sixth Army area are beating the drums for a transcontinental net. Coast to coast on MARS—doesn't sound too bad, at that. A6AOL and A6JVG are chief spokesmen for the net.

A MARS Mobile Radio Truck is on an extended tour through Sixth Army area building good will and effectively demonstrating the capabilities of amateur radio to other hams and to the general public. All Sixth Army MARTIANS have been urged to assist the truck (A6IHI) by trying to establish contact. Any member passing traffic received from IHI to A6USA receives drill participation credit.

A dynamic exhibition was set up at The Presidio Armed Forces Day, taking personal messages from all visitors. Through MARS and amateur nets, A6USA/W6USA handled 1,800 messages, collected at its display.

MARS USARPAC

Three nets are now operating in USARPAC. A system of putting out component parts where they can be used has been worked out here (probably not feasible stateside because of personnel shortage again). Maintenance Kits have been assembled at the MARS warehouse at Helemano. So far two of them have been issued to any MARTIAN who called for it. Kit 1 contained one assortment, Kit 2 an entirely different batch of spare parts, tape, hardware, condensors, resistors, headphones, and miscellaneous items.

A couple of happy sergeants are SFC Clifford Hedlund and SFC Walter Johnson, shown with a Sixth Army MARS-issue Signal Shifter they have just received.

For the beginner, the USARPAC is now assembling a MARS Transmitter Kit. This kit will contain the majority of items required to build a small transmitter. A6FX, who designed it, terms it just the transmitter to learn on. Along with this item, USARPAC has available code practice records, all speeds, some tubes and meters.

FAR EAST COMMAND

Progress on activation of the GHQ FEC net control station has been slow, due to the press of higher priority work. The 71st Signal Service Battalion, which installs and operates radio communications facilities for the headquarters, is putting the station equipment together. Meanwhile JA2FE/AD1AB, Battalion Radio Club station is carrying the mail.

Latest report from Philippine activities reveals—

Captain Vaughn (Air Force), Philcom MARS Director, is planning a school on MARS procedure.

Philcom MARS nets will be crystal controlled only.

Local salvage at Clark AFB yielded little desirable equipment.

Local supply agencies are now screening for desirable items which are surplus or salvage.

MARS CARIBBEAN

MARS Station Directors of each major post in the Canal Zone have been supplied with sufficient serviceable equipment to enable activation of an Intra-Isthmus net. Equipment in use at the primary stations will be the Collins 32RA–7 and Radio Transmitter BC–452. The net will start initially with the following member stations: AC5AA, Quarry Heights; AC5FA, Fort Amador; AC5FG, Fort Gulick; AC5FC, Fort Clayton; and AC5FR, Fort Kobbe.

AFRICA, EUROPE, MIDDLE EAST

Following is the complete text of a message sent via MARS to AE3US, Ankara, Turkey, 23 June 1950.

"Congratulations on the completely successful first year's operation of AE3US as a MARS member. The fine spirit of cooperation and efficiency evidenced by your station is commendable and we look forward to future mutually successful relationship."—the message was signed by Brig. Gen. Wesley T. Guest, Chief, Army Communications Service Division, U. S. Army.

LT. COL. FRED ELSER operates AE3US at Ankara, Turkey.

MARS AIR FORCE STATION LIST

MILITARY DISTRICT OF WASHINGTON

AIR	Hq USAF Station, 5 D 181, The Pentagon, Washington 25, D. C.
AF2CCH	Eugene V. Jurasinski, 1909 AACS Det, Wash Nat'l Airport, Washington, D. C
AF2CIG	Arthur F. Dougherty, Bolling AFB, Washington 25, D. C.
AF2UHP/3	Dean G. Roath, 339 Southampton Drive, Silver Spring, Md.
AF3BI	Albert B. Pitts, 3711 Upton Street NW., Washington, D. C.
AF3CO	Hollingsworth F. Gregory, 1855 Taylor Street NW., Washington, D. C.
AF3FMC	Hq AACS Station, Andrews AFB, Washington 25, D. C.
AF3FWX	Richard D. Cortright, 412 E. Melbourne Avenue, Silver Spring, Md.
AF3KNZ	Terrence Biggs, 315 59th Place NE., Washington 19, D. C.
AF3NTC	Albert F. Kuschner, 3315 17th Street NW., Washington, D. C.
AF3ORO	Albert L. Hamel.
AF3PZZ	John S. Tait, 9700 Cedar Lane, Bethesda 14, Md.
AF3QLM	Crawford F. Sullivan, 434 Buchanan Street NW., Washington, D. C.
AF4EJM	Edmund C. Lynch, 6298 15th Road North, Falls Church, Va.
AF4HBD	Harry T. Simms, RFD 2, Old Dominion Road, Falls Church, Va.
AF4KWG	Gerald E. Branch, 49 Woodmont Road, Bellehaven, Alexandria, Va.
AF4LEK	Lawrence C. Sheetz, 161 Arlington Village, Arlington, Va.
AF4MQL	John W. Dell, 3146 South Glebe Road, Arlington, Va.
AF4OBX	David D. K. Muhlenberg, 14½ East Myrtle Street, Alexandria, Va.
AF4OHI	Lassiter A. Mason, 304 East Greenway Blvd., Falls Church, Va.
AF4OJL	Elmer I. Carriker, 3407 3rd Street North, Arlington, Va.
AF4OST	James M. Williams, Temple Trailer Village, Alexandria, Va.
AF4OTZ	Francis H. Griswold, 2314 Valley Drive, Alexandria, Va.
AF4OWH	Ira W. Matteson, Temple Trailer Village, Alexandria, Va.
AF4PNZ	Woodrow W. Dunlop, 505 Great Falls Street, Falls Church, Va.
AF4PPY	Philip A. Gugliotta, 5620 North 23d Street, Arlington, Va.
AF4PXI	George J. Watts, 506 Johnson Road, Falls Church, Va.
AF4RB	Rawleigh H. Ralls, 3106 North Quincy, Arlington, Va.
AF4REN	William H. Payton, 5662 North 8th Road, Arlington, Va.
AF4RGE	Charles E. Melcher, Chantilly, Va.
AF5OMJ/3	Walter H. Volkmann, 1100th Medical Gp, Bolling AFB, Washington, D. C.

FIRST AIR FORCE, CONAC

AF1BDI	Francis E. Handy, 35 Brookline Drive, West Hartford 7, Conn.
AF1BEQ	Stephen Loyzim, RFD 44A, Coventry, Conn.
AF1CSL	Robert A. Bahlav, Taylor Avenue Extension, Bethel, Conn.
AF1CTC	Joseph B. Doolittle, 51 Pond Street, Milford, Conn.
AF1CUC	Stanley F. Wade, 15 Thicket Street, South Weymouth 90, Mass.
AF1DJN	Frank H. Mitchell, 140 Lincoln, Hamden, Conn.
AF1FAA	103d AC&W Sq Station, Conn. ANG, Milford Point, Milford Conn.
AF1FNV	Daniel J. Culliton, Still River Road, Harvard, Mass.
AF1FQ	Leslie C. Heartz, 122 Clifford Street, South Portland, Me.
AF1HOM	Adalbert T. Zwink, 3 Inverness Road, Arlington, Mass.
AF1JXE	Harry C. Rice, 193 Woodland Avenue, Gardner, Mass.
AF1KDW	Walter R. Szarek, 162 Ingleside Avenue, Worcester, Mass.
AF1KP	Hugh L. Walker, 289 Main Street, Hingham, Mass.
AF1KU	Hq 202d ASG Station, Mass. ANG, Logan Airport, East Boston 28, Mass.
AF1MEM	George A. Colafati, 48 Fulton Street, New Haven, Conn.
AF1MKD	Armand J. Bosse, 150 Orange Street, Manchester, N. H.
AF1NJI	John Olivieri, 14 Byron Ct, Roxbury, Mass.
AF1NJM	George Hart, 66 Highland Street, Newington, Conn.
AF1NU	Melvin D. Getchell, 127 Monument Street, West Medford, Mass.
AF1OAG	Donald F. Gorham, 4 Glen Street, Milford, Conn.
AF1PFT	Robert A. Hickey, 51 Gallivan Blvd., Dorchester 24, Mass.
AF1PRT	John R. Barber, 85 Mountain Avenue, Bloomfield, Conn.
AF1PS	George K. Thompson, Christian Hill Road, Lovell, Me.
AF1PWB	Laurence P. Barrett, 32 Concord Avenue, St. Johnsbury, Vt.
AF1PZU	Ernest A. Harris, Box 114, Mast Road, Manchester, N. H.
AF1QCT	Hugh W. McLane, 7 Jenks Street, Amherst, Mass.
AF1QEG	Horace E. Bamburg, Dow AFB, T-438, Bangor, Me.

AF1RBV	Charles S. Starkweather, Hallett Road, Chatham, Mass.
AF1RHY	James N. Brown, Jr., 27 Pitman Avenue, Greenwood, Mass.
AF1RJA	Edson L. Bristol, 227 North Street, Milford, Conn.
AF1RJJ	George T. Hine, Jr., Derby Turnpike, Orange, Conn.
AF1RKS	Firmin J. Bishop, Jr., 47-7 Summer Street, Waltham, Mass.
AF1RLA	Melvin L. Myers, 292 Washington Avenue, Chelsea, Mass.
AF1RPL/2	Charles E. Hughes, Hq & Hq Sq, 52d ABG, Mitchel AFB, N. Y.
AF1RVE	Arthur W. Coffland, 1149 ASU, Yale University, New Haven, Conn.
AF1SCJ	Raymond G. Minor, RFD #1, Williston, Vt.
AF1SGK	Harry Seymour, BU T-85, Grenier AFB, Manchester, N. H.
AF1SGN	John M. Palmer, Jr., 27 Fairport Road, Southport, Conn.
AF1SHF	James D. Jardine, 164 Main Street, Buzzards Bay, Mass.
AF1YBV	Charles J. Ellis, University Club, Bridgeport, Conn.
AF2ALY	Barry E. Houser, 188 Water, Perth Amboy, N. J.
AF2ANB	John F. Longley, 1623 New Scotland Road, Slingerlands, N. Y.
AF2ASU	Stanley R. Rose, 645 East 14th Street, New York 9, N. Y.
AF2BAE	Robert Hayos, 219 W. 81st Street, New York, N. Y.
AF2BF	William N. Baker, 324 East Street, Bound Brook, N. J.
AF2BGS/1	Rogers M. Doering, Dunster K-51, Cambridge 38, Mass.
AF2BSA	Silvio E. Hernandez, 123 Brown Road, Scarsdale, N. Y.
AF2BX	Merrill D. Beam, 118 Lewis Street, Eatontown, N. J.
AF2BXE	Austin C. Farrell, 86 Gidnez Avenue, Newburgh, N. Y.
AF2BXG	Lewis W. Procop, Mitchel AFB, N. Y.
AF2CUB	Andrew W. Hutnik, 981 Smith Street, Trenton 10, N. J.
AF2DFL	Henry A. Mott, 140-11 246th Street, Rosedale 10, N. Y.
AF2DNG	James S. Hurst, 554 Patten Avenue, Long Branch, N. J.
AF2DVP	Fred Henson, 28th Comm Sq, Mitchel AFB, N. Y.
AF2DYJ	Philip Karsten, 2522 University Avenue, New York, N. Y.
AF2EIO	Philip J. Levens, 73-37 Littleneck Parkway, Floral Park, N. Y.
AF2FAC	1802d AACS Gp Station, Mitchel AFB, N. Y.
AF2FAD	106th A/C Sq Station, NYNG, State Armory, White Plains, N. Y.
AF2FAF	Hq 1st Air Force Station, Mitchel AFB, N. Y.
AF2GFG	Erle D. Parker, Jr., 30 Newman Avenue, Verona, N. J.
AF2IAS	Orving C. Olsen, 1869 71st Street, Brooklyn 4, N. Y.
AF2INF	John W. Sullivan, 33 Mechanic Street, Glen Cove, N. Y.
AF2INZ	Alexander Goldenberg, 3051 Ocean Avenue, Brooklyn 35, N. Y.
AF2JLF	Frank J. Cirone, 60-16 255th Street, Little Neck, L. I., N. Y.
AF2KCV	John A. Robertson, 28 Andrew Lane, Levittown, N. Y.
AF2KVY	Robert L. Rod, 161 West 16th Street, New York 11, N. Y.
AF2LVP	Harold B. Dominy, Wainscott Road, Wainscott, N. Y.
AF2NCY	Henry Spillner, 60 Merritt Avenue, Dumont, N. J.
AF2NGY	Charles E. Schneider, 414 Roosevelt Avenue, Elberon, N. J.
AF2NHB	Amilcare F. Persichetty, 67 Hunton Street, Dongan Hills, Staten Island 4, N. Y.
AF2OLQ	Ramond J. Malone, 42 Oakland Street, Brooklyn, N. Y.
AF2OUU	Samuel Hecht, 221 Clark Street, Hillside, N. J.
AF2OYZ	David B. Garrett, 285 Powell Avenue, Newburgh, N. Y.
AF2PAJ	George Jacobs, 3620 Bedford Avenue, Brooklyn 10, N. Y.
AF2PCD	Renville H. McMann, Jr., 60 East 96th Street, New York 28, N. Y.
AF2PSO	John F. Ortner, 15 Yale Place, Rye, N. Y.
AF2QLZ	George H. Drought, 5 First Street, Harrison, N. Y.
AF2QNR	John S. DiBlasi, 43-10 Morgan Street, Little Neck, L. I., N. Y.
AF2QUV	Howard S. Liebman, 306 W. 93d Street, New York 25, N. Y.
AF2RDD	James W. Cronn, 419 Maple Street, West Hempstead, N. Y.
AF2SAA	Alexander Basil, 2415 Gladmore Street, Hempstead, N. Y.
AF2SIM	John M. Pincomb, 2 Great Oaks Road, Roslyn Heights, N. Y.
AF2SLL	Theodore Arkowitz, 54 Crabtree Lane, Levittown, Hicksville, N. Y.
AF2SXK	Alex L. Litinetsky, 455 South Broad, Trenton 10, N. J.
AF2TVR	Curtis F. Spinning, 908 Arnold Avenue, Utica 4, N. Y.
AF2UBO	Edward H. Sommerfield, 1212 Ocean Avenue, Brooklyn 30, N. Y.
AF2UMB	Leo T. Meister, 1526 Schley Street, Hillside, N. J.
AF2UXH	John C. Sambalino, 168 Hamilton Blvd., Kenmore, N. Y.
AF2VDQ	Harold A. Rogers, 17 Pine Street, Amsterdam, N. Y.
AF2VEH	Nathan E. Erikson, 451 Vermont Street, Brooklyn, N. Y.
AF2VEP	Harrison W. Madison, Jr., 120 N. 7th Street, Olean, N. Y.
AF2VEZ	Edward W. Wisnier, 181 Guilford Street, Buffalo 11, N. Y.
AF2VGT	Bill Fisher, 1160 Bryant Avenue, New York, N. Y.
AF2VIJ	Robert R. Skutt, 1948 Franklin Road, Valley Stream, L. I., N. Y.
AF2VL	Maurice R. Gutman, 5 Rebecca Lane, Oceanside, N. Y.

AF2WGS	Robert R. Green, 940 East Tower Road, Ithaca, N. Y.
AF2WIW	Elmer C. Barnett, Hq Sq, 1st AF, Mitchel AFB, N. Y.
AF2WXR	Charles F. Belmont, 2 Peter Cooper Road, New York 10, N. Y.
AF2WYQ	Ira Rubin, 1925 Quentin Road, Brooklyn 29, N. Y.
AF2YDJ	John F. Donnelly, 84 Mead Street, Hempstead, N. Y.
AF2YEW	William R. Gripenburg, 2230th AFRTC, Floyd Bennett NAS, Brooklyn 34, N. Y.
AF2YJD	Karl P. Johnson, 23-40 23d Street, Astoria 5, N. Y.
AF2YJI	Roger E. Franz, 118 Brinton, Buffalo, N. Y.
AF2ZCX	Walter L. Bourgeois, 211-81 91st Avenue, Queens Village, L. I., N. Y.
AF2ZDO	Joseph J. F. Curtin, 115-95 221st Street, Cambria Heights, New York, N. Y.
AF2ZJV	Ernest H. Barnes, VC-4, NAS, Atlantic City, N. J.
AF2ZM	Ralph G. Barber, 114 Chestnut Street, Garden City, N. Y.
AF2ZMA	Carl Youngs, 16 Moyston Street, Schenectady, N. Y.
AF2ZRX	Robert H. Wilder, 20 East Oneida, Baldwinsville, N. Y.
AF3AFR	George M. Hannah, Hamilton Avenue & Koppelman Lane, Baltimore 6, Md.
AF3OL/2	Edward L. Morrissey, 1802d AACS Gp, Mitchel AFB, N. Y.
AF4KKM/2	Robert N. Green, 940 Tee Court, Woodmere, N. Y.
AF5RGT/1	Ronald H. Earnest, 34th Comm Sq, 1st AF, Mitchel AFB, N. Y.
AF6ZSK/2	Robert R. Buckley, 30 Hawk Lane, Levittown, N. Y.
AG6AU/AF2	Merwin A. Griffiths, Apt. 8A, Bordertown Manor, N. J.
AK7QK/AF1	Max E. Pooley, 1915th AACS Sq, Dow AFB, Bangor, Me.
AF8WYP/2	Clayton A. Cool, Jr., 223 W. 14th Street, New York, N. Y.
AF9ADB/2	Stanley M. Gordon, 469 W. 163d Street, New York 32, N. Y.
AF9BMA/2	Lee Rissmiller, Quarters T-302, Santini, Gov. Proj, E. Hempstead, N. Y.
Opr Lic	Robert L. Callahan, Hampden Hilds, Me.
Opr Lic	Charles M. Kratz, 34th Comm Sq (Command), Mitchel AFB, N. Y.
Opr Lic	Michael Kuchwara, 1512 E. Colvin Street, Syracuse 10, N. Y.

HQ & HQ SQ, CONAC

AF1RWQ	Walter H. Steeves, 589 Maple Avenue, North Haven, Conn.
AF1SIJ	Richard W. Morris, 53A Revere Street, Portland, Me.
AF2AIR	Hq CONAC Station, Mitchel AFB, N. Y.
AF2BRJ	Charles C. Mouckerezi, 10 Chelsea Drive, Merrick, N. Y.
AF2DAW	Dennis E. Bull, Hq & Hq Sq, CONAC, Mitchel AFB, N. Y.
AF2DKP	Hobart R. Yeager, Quarters 340, Mitchel AFB, N. Y.
AF2DQF	Michael L. Crimmins, Hq CONAC, Mitchel AFB, N. Y.
AF2UTW	Robert L. Westfall, 7 Bungalow Place, Oceanside, N. Y.
AF2ZNY	Dale A. Rotz, Hq CONAC, Mitchel AFB, N. Y.
AF4KZO/2	Delevan E. Wolters, Hq CONAC, Mitchel AFB, N. Y.

FOURTH AIR FORCE, CONAC

AF2WXE/6	Frederic W. Schremp, 520 E. Commonwealth, Fullerton, Calif.
AF3PDU/6	James H. Rose, RFD 1, Novato Blvd. Novato, Calif.
AF4PKP/6	Frank D. May, Jr., Center Lane, Novato, Calif.
AF5QW/6	Leslie Rosenblatt, 1071 Cotter Way, Hayward, Calif.
AF6ABA	John P. Burke, 511 East 136th Street, Hawthorne, Calif.
AF6ANT	Julett H. Honeywell, 5322 Ben Avenue, North Hollywood, Calif.
AF6AT	Edward G. Arnold, 1420 El Miradero Avenue, Glendale 1, Calif.
AF6AWU	Val Fish, Jr., 3234 Central Avenue, Alameda, Calif.
AF6AXJ	John J. Berrier, Jr., 1325 Hemlock Avenue, Palm City, Calif.
AF6BBC	Kenneth R. Crosher, Quarters 222, Hamilton AFB, Calif.
AF6BKO	Donald W. Rick, 150 S. 2d, Apt. 2-E, Richmond, Calif.
AF6CFQ	Robert L. Cloud, 193 Langley Street, Vallejo, Calif.
AF6CPH	Eldridge S. Adams, 6600 West 81st Street, Los Angeles 45, Calif.
AF6DAR	Henry T. Carruth, Jr., 7539 Greenly Drive, Oakland, Calif.
AF6DHO	Edward R. Aguiar, 673 31st Street, Oakland, Calif.
AF6DIX	Kennard D. Wilson, 33 Landras, Novato, Calif.
AF6DKE	William L. Wafford, Jr., 1837 E. 19th Street, Oakland, Calif.
AF6DPI	Cecil E. Duncan, 1008 Sylvan Drive, San Carlos, Calif.
AF6DRC	Richard H. Hoffman, 5726 Melvin Avenue, Tarzana, Calif.
AF6DRN	Thomas L. Alburger, 354 Saipan Road, San Francisco, Calif.
AF6DTZ	Donald E. Bennet, 3514 Branson Drive, San Mateo, Calif.
AF6EGO	Edwin F. Laine, 2420 Virginia Street, Berkeley, Calif.

AF6EUQ	Winfred C. Stivers, 244 29th Street, Oakland 11, Calif.
AF6EVC	George E. Potter, 293 Taylor, Sunnyvale, Calif.
AF6EVR	Ronald C. Morris, 506 Corcoran Avenue, Chabot Terrace, Vallejo, Calif.
AF6FAI	James P. Ashby, Jr., 11032 Saragosa Street, Whittier, Calif.
AF6FAK	Hq 4th Rescue Sq Station, Hamilton AFB, Calif.
AF6FMQ	Wilbur C. Baker, 8613 South Davista, Whittier, Calif.
AF6FNG	61st Ftr Wg, Calif NG Station, 2155 Webster Street, Oakland, Calif.
AF6FRQ	Norman Haffly, RFD 9, Box 3524A, Sacramento, Calif.
AF6FSZ	Jack W. Dobson, 5850 Ludell, Bell Gardens, Calif.
AF6FVH	Francis A. Jewett, 234 Vernon, Mountain View, Calif.
AF6GBT	Arthur J. Stevens, 2315 Fernleaf Street, Los Angeles 31, Calif.
AF6GBY	Dwite M. McCloud, 8122 Holt, Buena Park, Calif.
AF6GHK	John E. McCuaig, 362 N. Alfred Street, Los Angeles, Calif.
AF6GXG	Harold R. Samuelson, 6063 Scenic Avenue, Hollywood, Calif.
AF6GYP	Thomas L. Stephens, 2122 Marshall Field, Redondo Beach, Calif.
AF6GZW	Max L. Conn, 56 Elm Street, Vallejo, Calif.
AF6HIU	Nogah Bethlahmy, 621 S. Dunsmuir Avenue, Los Angeles, Calif.
AF6HNN	James G. Barber, 1204 East 62d Street, Los Angeles, Calif.
AF6HOR	Robert H. Buckley, 3985 Whittle Avenue, Oakland 2, Calif.
AF6HPW	Richard H. Wallace, 948 Elden Avenue, Los Angeles 6, Calif.
AF6HXO	William F. Blinn, Claremont, Sharp Park, Calif.
AF6IHC	Daniel G. Olivier, Quarters 1007, Hamilton AFB, Calif.
AF6INQ	Ross D. Cade, 24 Lexington Avenue, San Bruno, Calif.
AF6JKW	Norman M. Weed, 1308 Park Avenue, Alameda, Calif.
AF6KLB	John R. Gillanders, 1055 Glenobra Street, Oakland, Calif.
AF6LHH	Paul W. Binford, RFD 1, Box 255, Novato, Calif.
AF6LTO	Richard I. Wilson, 1591 Carruth, Fresno, Calif.
AF6LVS	Russell J. Woollum, 1111 Harmony Drive, Hayward, Calif.
AF6MJM	Horton E. Stewart, Calhoun Street, Alameda, Calif.
AF6NJF	Claude H. Bowman, 301 Witmer Street, Los Angeles 13, Calif.
AF6NJJ	Alva R. Davis, Jr., 1159 Keeler Avenue, Berkeley 8, Calif.
AF6OQ/7	E. C. Murrill, Moses Lake AFB, Washington
AF6OYV	Lathan A. Clarke, 4325 Jasmine Avenue, Culver City, Calif.
AF6PCS	Gerald J. Fries, 2239 Simpson Street, Fresno, Calif.
AF6PVN	Howard C. Broughton, 818 Miller Avenue, South San Francisco, Calif.
AF6QIE	Donald Johnson, 132 Cherry Avenue, South San Francisco, Calif.
AF6RAS	Peter P. Dardani, 219 Topeka Avenue, San Francisco 24, Calif.
AF6RFQ	Welbo F. Dollins, 3710 Pauline Street, Compton, Calif.
AF6SMC	John T. Gaffey, II, 939 West 59th Drive, Los Angeles 44, Calif.
AF6TDK	Herbert C. Deacon, 1812 2d Street, Alameda, Calif.
AF6UFC	Charles E. Anderson, 8130 Rosecrans, Clearwater, Calif.
AF6UO	Richard T. Parks, 10 Le Roy Place, San Francisco 9, Calif.
AF6UWH	John S. Sutton, 5005 Buchanan Street, Los Angeles, Calif.
AAF6UYZ	Lloyd E. McCracken, 2054 West 84th Street, Los Angeles 47, Calif.
AF6VHY	Jack Mayo, 4802 East 2d Street, Long Beach, Calif.
AF6VWD	Robert F. Kofron, 4734 Blackthorne Avenue, Long Beach, Calif.
AF6VXI	Buren O. Eagle, 116 English Street, Petaluma, Calif.
AF6VYL	Charles T. B. Clark, RFD 1, Box 1286, Norco, Calif.
AF6WBY	Robert L. Collins, Naval Air Facility, P. O. Box 196, China Lake, Calif.
AF6WET	Ralph N. Van Natta, 648 Humboldt Road, Brisbane, Calif.
AF6WHX	Robert A. Moser, 5020 West 123d Place, Hawthorne, Calif.
AF6WIQ	John J. Quinn, 22344 Vanowen Street, Canoga Park, Calif.
AF6WJD	Smith A. Paddock, Jr., 703 Aldama Terrace, Los Angeles, Calif.
AF6WNS	Robert S. Griffith, 1430 Colin Street, Richmond, Calif.
AF6WUG	Charles G. Walker, 188 S. Fern Avenue, Upland, Calif.
AF6WUT	Ray J. Bishop, 534 Dayman Street, Long Beach 6, Calif.
AF6YER	John A. Litwin, 831 Victory Avenue, South San Francisco, Calif.
AF6YGW	Edward R. Barrett, 446 Stevens Road, Mt. View, Calif .
AF6YLY	John S. Anderson, 4267 Coronado Avenue, San Diego, Calif.
AF6YOL	Jack R. Davis, 8081 East Franklin Street, Buena Park, Calif.
AF6YSB	Loren W. Thomas, 2610 East 219th Place, Long Beach, Calif.
AF6YSS	Emmett J. Kelly, 700 Radcliffe, Pacific Palisades, Calif.
AF6YWQ	Chester L. Keene, 4317 Madison Avenue, Fresno, Calif.
AF6ZF	Ronald G. Martin, 2638 13th Street, Sacramento, Calif.
AF6ZHY	Henry W. Berriman, 2919 Newbury Street, Berkeley, Calif.
AF6ZPJ	John I. Craig, 7850 Sunset Blvd., Hollywood, Calif.
AF6ZTX	Benjamin R. Spells, 1410 Grandhaven, Salinas, Calif.

AF7AIR	E. C. Murril, Moses Lake AFB, Wash.
AF7BEB	Harold A. Gilbertson, 1513 10th Avenue South, Great Falls, Mont.
AF7BGZ	Jerome B. Rooney, 1317 Boren Avenue, Seattle, Wash.
AF7CGA	Frank R. Milligan, 2911 East 53d Street, Seattle, Wash.
AF7FAF	Samuel D. James, 5531 SW Brugger Street, Portland 19, Oreg.
AF7HKV	John E. Nagley, P. O. Box 1751, Prescott, Ariz.
AF7HWC	William O. Eden, 4106 NE 114th, Portland, Oreg.
AF7IDZ	Howard R. Patrick, 611 West 10th Street, Port Angeles, Wash.
AF7IFG	Robert G. Bailey, 332 Main Street, Lewiston, Ida.
AF7IPD	John D. Van Blitter, P O. Box 33, Black Springs, Nev.
AF7JAH	Dale C. Gibson, Unit B-34, Sahara Village, Utah.
AF7JDD	Willard E. Spencer, Jr., 24-B South Fairway, Pullman, Wash.
AF7JHG	William H. Robinson, 2053 East 17th South, Salt Lake City, Utah.
AF7JIR	Oliver W. Hanson, 74 South 1st West, Preston, Idaho.
AF7JKD	Ernest F. Wilson, 165 South Allen Street, Fallon, Nev.
AF7JMC	Carlton F. Borchert, 1595 W. Wetmore Road, Tucson, Ariz.
AF7JQK	Peter Economy, 605 Sullivan Street, Miami, Ariz.
AF7KCK	Donald T. Galarneau, 7117 North Seward, Portland, Oreg.
AF7KOV	Edwin W. Johnson, 5264 North Harvard, Portland, Oreg.
AF7KV	Ralph J. Gibbons, 19848 Marine View Drive, Seattle, Wash.
AF7KVB	Edward M. Davis, 4323 NE. 113 Avenue, Portland, Oreg.
AF7LMQ	Robert R. Finnell, 1114 South Central Street, Olympia, Wash.
AF7LSW	Egon H. Elssner, 9314 NE. Sacramento Street, Portland, Oreg.
AF7LUB	Milford N. Sanders, 2026 North 31st Avenue, Phoenix, Ariz.
AF7LWP	Jack A. Powers, 2042 North Richland, Phoenix, Ariz.
AF7MBK	Carroll O. Gaskins, Quarters 659A, McChord AFB, Tacoma, Wash.
AF7MKY	Eddie L. Rainey, Portland Airport, Portland, Oreg.
AF7MUI	Paul A. Doty, 2541 Richland Street, Phoenix, Ariz.
AF7MWZ	Gordon L. Beckstead, 2330 E. Willetta, Phoenix, Ariz.
AF7MXE	Fred E. Vaughn, 2673 Alder Street, Eugene, Oreg.
AF7NSL	Joseph F. Thomasson, 325th Maint. Sq, Ftr All Wea, Moses Lake AFB, Wash.
AF7OFL	John M. Somerville, 724 East 43d Avenue, Vancouver, Wash.
AF7UKG	Earl E. Stacy, 1117 South 19th Avenue, Yakima, Wash.

NINTH AIR FORCE, CONAC

AF3BT	Wilson K. Winbigler, 3007 North Calvert Street, Baltimore 18, Md.
AF3FAG	111th Bomb Gp Pa NG Station, Island Road, Philadelphia International Airport Philadelphia, Pa.
AF3GRZ	Clyde E. Gangawere, 223 Walnut Avenue, Greensburg, Pa.
AF3ICW	Alvin E. Robinson, 832 Zenia Street SE., Washington 25, D. C.
AF3IXJ	James P. Collins, Jr., Hilltop Road, Catonsville, Baltimore 28, Md.
AF3KZA	Seymour Kalso, 1029 Fanshawe Street, Philadelphia, Pa.
AF3LCF	Vernon G. Swann, 2237 AFRTC, Reading Municipal Airport, Reading, Pa.
AF3LEE	Chester W. Calvin, RFD 1, New Cumberland, Pa.
AF3MPG	Francis C. Gillam, 1103 Dryden Street, Sligo Park Knolls, Md.
AF3MWY	George W. Morgan, 2833 Fleetwood Avenue, Baltimore 14, Md.
AF3NBB	Ernest L. Morrison, Jr., 129 Parkway, McKeesport, Pa.
AF3NRD	Walter R. McGuire, 602½ Vine Street, Coraopolis, Pa.
AF3NUV	Patrick E. Perrott, 7524 Berkshire Road, Baltimore, Md.
AF3OEJ	Karl L. Booker, 2014 Gynn Oak Avenue, Woodlawn 7, Md.
AF3ONU	Robert E. Russell, 504 Hancock Road, Lexington Park, Md.
AF3OOF	Lawrence A. Shafer, 114 West Front Street, Oil City, Pa.
AF3OQX	Donald N. Bachman, 1042 Walnut Street, Allentown, Pa.
AF3PMM	Gabriel A. Sweeney, 402 Exton Road, Hatboro, Pa.
AF3PPD	Ross A. Pinti, 703 Fruit Avenue, Farrell, Pa.
AF3PWI	Benjamin H. Biays, Jr., 7010 Exeter Road, Bethesda 14, Md.
AF3VHG	Emanuel Trompeter, 4909 13th Street NW., Washington 11, D. C.
AF4AIG	Laurence V. Lillvik, 8 Gibson Road, Hampton, Va.
AF4DVY	Joe R. Patton, 920 Society Avenue, Albany, Ga.
AF4HWF/8	Eugene C. Hoelzle,, 4510 North Dixie Drive, Dayton, Ohio.
AF4KEH	George R. Foreman, 12 Richmond Avenue, Langley View, Va.
AF4KJT	Joseph R. Paradis, 462B 8th Avenue, Fort Knox, Ky.
AF4KQE	William B. Sprouse, 20th Street, Wytheville, Va.
AF4MEY	Clarence B. Diersing, Jr., P. O. Box 479, Louisville, Ky.
AF4NOO	James P. West, Apt. A-2, 4540 South 21st Road, Arlington, Va.

AF4NTJ	William L. Schmitt, Hq & Hq Sq, 9th AF, Langley AFB, Va.
AF4OCU	Oliver N. Heath, 505 E Street, Newport News, Va.
AF4OKK	Alfred L. Jones, 3811 Stratsford Road, Hampton, Va.
AF4OMS	Vincent T. Wathen, 5887 Wickham Avenue, Newport News, Va.
AF4ONU	Julian G. Tucker, 29th Comm Sq, Langley AFB, Va.
AF4OQU	Martin F. Oberg, 1621 Marshall Place, Newport News, Va.
AF4OWS	Lomax G. Sawyer, Aydlett, N. C.
AF4OXT	Donald Cohen, 650 South 37th, Apt. 5, Louisville, Ky.
AF4OYA	Lamar E. Williams, 316 Tappan Avenue, Buckree Beach, Va.
AF4PED	Charles N. Wright, 901 Euclid Avenue, Lynchburg, Va.
AF4PMG	James A. Kent, 4017 Valley View Drive, Louisville 5, Ky.
AF4PRO	Marion A. Wise, Hq & Hq Sq, 9th AFB, Langley AFB, Va.
AF4QBN	Bryant M. Chestnutt, 2505 The Terrace, Richmond, Va.
AF4QCA	Robert W. Cook, 222 C Street, Newport News, Va.
AF4QDJ	Arnold B. Finch, 124 Powhatan Parkway, Hampton, Va.
AF4RBW	Francis E. Hepner, Harpersville, Va.
AF4RCF	Garth H. Stonehocker, 39 Williamsburg Road, Alexandria, Va.
AF4RCT	Clare W. Davis, 292 Freeman Drive, Pine Chapel Village, Hampton, Va.
AF4RDV	John F. O'Donnell, 272A Watts Avenue, Langley AFB, Va.
AF4REC	Roger P. Anderson, 416 Tappan Avenue, Buckroe Beach, Va.
AF8AIF	James A. F. McArthur, 2109 Hurd Street, Toledo, Ohio.
AF8BDM	Charles H. Whitaker, 463 Noan Avenue, Akron, Ohio.
AF8BUS	Paul J. Parobek, 3471 West 127th Street, Cleveland 11, Ohio.
AF8BZR	Gordon D. Sponseller, RFD 1, Bucyrus, Ohio.
AF8BZV	William S. Vardeman, 1011 East Main Street, Columbus, Ohio.
AF8CAC	Alfred M. Weniger, RFD 2, Grafton, Ohio.
AF8CVK	James W. Dawson, 6813 Grace Avenue, Cincinnati 27, Ohio.
AF8DJL	Ernest Q. Sferra, 517 Payne Avenue, Painesville, Ohio.
AF8DNL	William T. Coonrod, Box 3239, Columbia Heights, Washington 10, D. C.
AF8DPP	Charles R. Jack, Jr., 1983 Hilton Road, Cleveland, Ohio.
AF8DTD	Peter H. Bliss, 2196 Arthur, Lakewood, Ohio.
AF8DXG	Harold W. Murray, 1106 Linden Avenue, Zanesville, Ohio.
AF8EAV	William J. Johnson, 10807 Fortune Avenue, Cleveland, Ohio.
AF8EDM	Richard O. Gettys, 406 South William Street, Springfield, Ohio.
AF8FAC	Stephen S. Jenkins, Jr., 1465 Mt. Vernon Avenue, Columbus 3, Ohio.
AF8FBB	Donald W. Krenrick, 79 Dodge Avenue, Akron, Ohio.
AF8FBG	Steve J. Takacs, 601 F Marquardt Avenue, Cleveland 13, Ohio.
AF8GAV	Samuel E. Steele, 79 Hamilton Street, Berea, Ohio.
AF8GKP	Ralph L. Hitsman, 600 South Boston Street, Galien, Ohio.
AF8HOX	Howard M. Robison, 520 Elm Street, Wilmington, Ohio.
AF8MOG	William B. Haines, 291 South Chase Avenue, Columbus 4, Ohio.
AF8NAF	Everett G. Taylor, 912 Westminster Place, Dayton, Ohio.
AF8OJU	Robert L. Feibel, 55 South Roosevelt Avenue, Bexley, Ohio.
AF8QHR	Jack Farrance, 18913 Parkmount Avenue, Cleveland, Ohio.
AF8UAS	Joseph S. Yurko, 8352 Vanderbilt, Detroit, Mich.
AF8WDE	Donald R. Hollowell, 1843 West 54th Street, Cleveland, Ohio.
AF8YGE	Robert E. Ellis, 44 West Park Drive, Shelby, Ohio.
AF8ZDZ	James R. Dolvin, Wick-Campbell, Hubbard, Ohio.
AF8ZTZ	Elvin H. Cunningham, 1320 Lexington Avenue, Springfield, Ohio.
AF9CPR	Carl W. Steven, 220 West Sixth Street, Michigan City, Ind.
AF9SII	Robert N. Barkman, 6005 Homestead Drive, Indianapolis 44, Ind.
Opr Lic	Robert W. Morgan, 160th Tac Rcn Sq, Langley AFB, Va.

TENTH AIR FORCE, CONAC

AF2QPM/Ø	Charles H. Crosby, 100 Arapahoe, Boulder, Colo.
AF2WWX/9	Alan Borken, Box 78, Cary Hall SE, Purdue University, Ind.
AF3PHL/9	Frederic Doughty, #9 Snowden Road, Cynwyd, Pa.
AF4LRT/8	Gordon R. Wiren, Flt C, 2151st Rescue Unit, Selfridge AFB, Mich.
AF5OHX	Ernest J. Bissonette, Jr.
AF7LUC Ø	William V. Stevenson, 4435 South Lincoln, Englewood, Colo.
AF8AUY	Henry A. Blum, 19326 Hershey, Detroit, Mich.
AF8CHO	Charles A. Koppe, 751 West Bethune, Detroit, Mich.
AF8CRZ	Harland S. Laycock, 844 Pammel Court, Ames, Iowa
AF8DUK	George D. Beauchamp, Quarters 259B, Selfridge AFB, Mich.
AF8FAC	Hq 439 Troop Carrier Wg Station, Selfridge AFB, Mich.

AF8FAG	Hq 10th AF Station, Selfridge AFB, Mich.
AF8FEN	Raymond J. Fowler, 4533 South River Road, Mt. Clemens, Mich.
AF8PQK	Robert H. Ekleberry, 2336 St. James Avenue, Cincinnati 6, Ohio.
AF8UFH	Julius M. Hoffer, 2269 Elmhurst, Detroit, Mich.
AF8VCN	Frank E. Ostrow, 18304 Winthrop, Detroit, Mich.
AF8YBU	Arvid A. McPherson, RFD 3, West Branch, Mich.
AF8ZUA	Clarence L. Fulkerson, Detroit-Wayne Major Airport, Romulus, Mich.
AF9BVF	Russell B. Markwith, Jr., 2506 Miner Street, Fort Wayne, Ind.
AF9BVT	Jack R. Mullen, Box 111, Zanesville, Ind.
AF9CMK	Joseph A. Cusak, 158 Morrissey Hall, Notre Dame, Ind.
AF9EBU	Richard H. Voley, Hq 66th Ftr Wg, Ill ANG, O'Hare International Airport, Park Ridge, Ill.
AF9EOP	John H. Parry, 319 West Mechanic Street, Hillsboro, Ill.
AF9EZX	Wilbur S. Downing, Jr., 6638 North Ogallah, Chicago, Ill.
AF9FAA	128th AC&W Sq Station, 4840 South Howell Avenue, Milwaukee, Wis.
AF9FAG	66th FTR WG Station, Ill ANG, O'Hare International Airport, Park Ridge, Ill.
AF9FBH	Robert M. Daly, 6321 North Winthrop, Chicago 40, Ill.
AF9GCG	Maurice F. Johnson, 707 North 39th Street, East St. Louis, Ill.
AF9GHV	Clyde C. Lockwood, RFD, Gorbutt Trailer Court, Bartholomew, Ind.
AF9HHF	Charles H. McInnis, Quarters 1500C, Benjamin Harrison AFB, Ind.
AF9IGW	Wayne Warden, Jr., 412 Ballantine, Bloomington, Ind.
AF9JER	Kenneth W. Retzer, 1003 South Layton Blvd., Milwaukee, Wis.
AF9JOM	Robert M. Beltz, 660th AC&W Sq, Selfridge AFB, Mich.
AF9LXI	George L. McGregor, Lincoln Highway West, Fort Wayne 8, Ind.
AF9MBO	Delyvn J. Lingen, 5903 Dale Lane, Greendale, Wis.
AF9PKA	Arthur F. Mahnke, 23 156th Place, Calumet City, Ill.
AF9QJR	James M. Lattig, RFD 1, Cropsey, Ill.
AF9RQX	Maurice R. Riggins, 432 North Campbell, Macomb, Ill.
AF9RSR	Henry W. Husting, 511 West Wilson, Madison, Wis.
AF9TWK	Fredrick C. Himebrook, 2032 Welwyn Avenue, Des Plaines, Ill.
AF9VSO	Art F. Vahovius, 4707 North Elkhart Avenue, Milwaukee, Wis.
AF9VUM	Samuel Wise, 3808 North Monticello Avenue, Chicago 18, Ill.
AF9YFK	Paul E. Wiesike, 6555 North Drake Avenue, Chicago, Ill.
AF9ZNT	Melvin K. Meyer, 1502 Ridge Road, Homewood, Ill.
AFØAGD	John E. Magnusson, 402 Ninth Avenue South, Fargo, N. Dak.
AFØAKB	Neil A. Webster, Second Street, Guttenberg, Iowa.
AFØAKR	Robert L. Frazier, 1001 Sanders Avenue, Webster Groves, Mo.
AFØBVG	James E. Hankins, 1065 Thelma Street, Springfield, Mo.
AFØCQK	John A. Derrick, 1808 West 10th Street, Sioux Falls, S. Dak.
AFØDLN	Martin R. Beebe, BOQ T-580, Fort Leavenworth, Kans.
AFØDMN	Clifford L. Whipple, Sherman AFB, Fort Leavenworth, Kans.
AFØDSF	Arthur M. Monsees, 17th & University Avenues SE., Minneapolis, Minn.
AFØEAE	Lawrence F. McAdams, 1944 Hanover Street, Aurora, Colo.
AFØEIP	Victor W. Bolie, 124 Kingsbury Avenue, Ames, Iowa
AFØFAF	110th Ftr Wg Station, 231 ASG, Hq Det, Lambert Field, St. Louis 21, Mo.
AFØFAI	139th AC&W Sq Station, Box 341, Boulder, Colo.
AFØFHA	George L. Davenport, RFD 3, Box 3, Chadnol, Nebr.
AFØFNU	Robert C. Kerl, Barracks 123, Brookings, S. Dak.
AFØFOU	William F. Johnson, 581 South University, Denver 9, Colo.
AFØFTD	Clarence A. Resch, 1214 West Maple Avenue, Independence, Mo.
AFØHBQ	Philip E. J. Brooks, 937 King Street, Chadron, Nebr.
AFØIC	Claude M. Maer, 740 Lafayette Street, Denver, Colo.
AFØIZF	Albert J. Ward, 2341 Wallace, Clinton, Iowa.
AFØJIX	Lewis W. Harshbarger, 2301 South Marion Street, Denver 10, Colo.
AFØKWK	Philip D. Goldhammer, 860 Ogden Street, Denver, Colo.
AFØLFI	Harold V. T'Kach, 4139 Bloomington, Minneapolis 7, Minn.
AFØLIB	Donald H. Marcotte, 606 West Lyon Street, Marshall, Minn.
AFØMFX	Jack W. Howe, 157 North Huland, Ames, Iowa.
AFØMSC	Lee B. Stripling, 210 Hellems Hall, Boulder, Colo.
AFØMZU	Walter Y. Fish, Staff House #15, Rosemount, Minn.
AFØNAY	William S. Morton, RFD 1, Bloomfield, Iowa.
AFØNMR	Herbert Gordon, 4512 Westminister Place, St. Louis 8, Mo.
AFØOAD	Frank M. Allen, 1920 Willow Street, Denver, Colo.
AFØOMT	Jarrett C. Epps, 315 Spruce Street, Kansas City, Mo.
AFØPFT	Marion C. Edson, Jr., RFD 3, Fort Dodge, Iowa.
AFØPSE	William R. Lynn, 409 West 3d Street, Coffeyville, Kans.
AFØPVK	Milton M. Hawley, RFD 7, Box 290, St. Louis 21, Mo.

AFØQBC	James S. Joska, 1117 Scott Road, Apt. C, St. Louis, Mo.
AFØQDC	Harry J. Perrin, 4875 Raritan Street, Denver, Colo.
AFØQVB	Harry C. Butterfield, Jr., Ninth Street, Independence, Mo.
AFØRZQ	Gaylord F. St. Thomas, 2710 East Maryland, St. Paul, Minn.
AFØTCI	Robert J. Bahr, 70 Gregg Road, St. Louis 23, Mo.
AFØTDK	Warren C. Blood, 1729A, Elliott Avenue, St. Louis 6, Mo.
AFØTDW	Harry L. Barr, Jr., 1012 South Denver Street, El Dorado, Kans.
AFØTGL	Kenneth N. Keyte, 4615 Douglas, Des Moines, Iowa
AFØTHG	Charles N. McCandless, 431 Gaylord Avenue, Pueblo, Colo.
AFØUKF	George A. Loveall, Jr., 1481 Newell, Waterloo, Iowa
AFØVG	Hance G. VanBeber, 501 South Vermont, Columbus, Kans.
AFØVHA	Francis J. Deuschle, 1522 West 47th Avenue, Denver, Colo.
AFØVZV	Alfred R. Peters, 5807A Goener Avenue, St. Louis 16, Mo.
AFØWAX/8	Richard F. Turpin, Jr., 56th Comm Sq, Selfridge AFB, Mich.
AFØWLN	Robert N. Jensen, 1610 Nome Street, Aurora, Colo.

TWELFTH AIR FORCE, CONAC

AF4GDC/5	Robert G. Russell, 3024 Fulton Street, Shreveport, La.
AF5ACW	Joseph S. Chance, 712 Santa Fe, Alva, Okla.
AF5BGC	Harry C. Wilson, 79 West Miami, McAlester, Okla.
AF5BHO	David H. Calk, 7730 Joplin Street, Houston, Tex.
AF5BKJ	Kyle Johnson, 115 Hoover Avenue, San Antonio, Tex.
AF5BPL	Henry W. Thomas, 8515 Banks Street, New Orleans, La.
AF5COB	Charles A. Francis, 7401 Satuma Street, Houston 12, Tex.
AF5DZ	William P. Clarke, RFD 2, Box 108, Waco, Tex.
AF5EHC	Carl C. Drumeller, 5824 NW. 58th Street, Oklahoma City 7, Okla.
AF5EIS	Joe B. Porter, 647 McIlvaine, San Antonio, Tex.
AF5FSP	Milton D. Haines, 226 St. John Street, San Antonio, Tex.
AF5FYA	Donald T. O'Connor, Quarters 28, Kelly AFB, Tex.
AF5GLP	Charles S. Kindred, 817 Shelton Avenue, Kingsville, Tex.
AF5KUC	Robert W. Wagner, 3311 Pennsylvania Street, Dallas, Tex.
AF5KYJ	William F. Casey, 435 Corona Avenue, San Antonio, Tex.
AF5LEE	James G. Anding, Jr., 122 North 13, Baton Rouge, La.
AF5MIR	Luther M. Lester, 2832 East Admiral Court, Tulsa, Okla.
AF5MJJ	John R. Joplin, 724 Hatcher, San Angelo, Tex.
AF5MOM	Robert B. Gallman, 15 West Davidson, Fayetteville, Ark.
AF5MQU	Don F. Johndrow, RFD 3, Box 100, Tulsa, Okla.
AF5MTQ	George W. Haley, 1122 Grand Prairie, Grand Prairie, Tex.
AF5NBW	James W. Ferguson, RFD 2, Box 184, Siloam Springs, Ark.
AF5NKY	Elwood R. Smith, 4012 Amherst, Houston, Tex.
AF5NQJ	Juan F. Valadez, 1210 Sample Street, El Paso, Tex.
AF5NQY	Denzil S. Overman, Box 340, Brooks AFB, Tex.
AF5NRJ	William A. Braunig, 619 North 11th Street, McAllen, Tex.
AF5NUF	Rawleigh D. Jones, 1003 Garden Street, Bossier City, La.
AF5OBB	Everett E. McCulloch, 300 Southeast 11th Street, Grand Prairie, Tex.
AF5OCB	William D. Wofford, 7537 Edna Street, Houston, Tex.
AF5OCG	William H. Peel, 527 Ogden Lane, San Antonio, Tex.
AF5OCT	Harold A. Rhoads, 609 State Street, Little Rock, Ark.
AF5OGD	Byron V. Cox, Jr., Pre-Fab G-17, Sooner City, Norman, Okla.
AF5OOJ	Wayne T. Hufford, 253 South 68th East Avenue, Tulsa, Okla.
AF5OVD	Granville Murphy, 705 Bliss Street, Dumas, Tex.
AF5OXL	George E. Beal, Jr., Cadet Det. Box 7, Connally AFB, Waco, Tex.
AF5PHH	Jack B. Wood, 4537 East 5th Place, Tulsa, Okla.
AF5PIF	Guy E. Foster, Jr., 612 NW. 24th Street, Oklahoma City, Okla.
AF5PJM	Alfred T. Roberts, 519½ Rutherford, Shreveport, La.
AF5PMW	William R. Rawlings, 741½ Unadilla, Shreveport, La.
AF5PNB	James H. Long, 1740 Fairfield Avenue, Shreveport, La.
AF5PNJ	Adam F. Bowden, 118 Skyline Road, Grand Prairie, Tex.
AF5PUE	Lee F. Ruth, Quarters 1261-A, Kelly AFB, San Antonio, Tex.
AF5PVJ	Homer L. Bellair, 2222 Fifth Street, Port Neches, Tex.
AF5PVM	Philip D. Miller, 715 Carlisle, Albuquerque, N. Mex.
AF5PVY	William F. Fritsche, Jr., 302 Fredericksburg Road, San Antonio, Tex.
AF5PWD	Kenneth L. Harris, 1210 E. Tijeras, Albuquerque, N. Mex.
AF5PWL	Norman S. Edwards, 1552 Harcourt Drive, Apt. A, New Orleans, La.
AF5QCU	Otto J. Grover, 626 Lauricella Avenue, New Orleans, La.

AF5QZM	William C. Fulford, 1017 Lee Street, Pasadena, Tex.
AF5QZP	Norman W. Rehbein, 146 Kashmuir Place, San Antonio, Tex.
AF5RAE	James O. Dafft, 1710 Random Road, Carrollton, Tex.
AF5RBY	Kenneth R. Rose, 1923 AACS Det, Ellington AFB, Tex.
AF5RCD	Forrest M. John, 530 West Mandalay, San Antonio, Tex.
AF5REL	George F. Shivers, 305A East Aeronca Drive, Midwest City, Okla.
AF5RGX	Earl W. Carsner, 943 West Mistletoe Avenue, San Antonio, Tex.
AF5RHA	Oakley L. Stockton, 239 Kashmuir Place, San Antonio, Tex.
AF5RHK	William A. Werber, 204 West Huff Avenue, San Antonio, Tex.
AF5TG	James W. Hunt, 7802 Valerye Street, Houston, Tex.
AF5VWU	John R. Johnson, 4628 Washington Place, Albuquerque, N. Mex.
AF9HOO/5	William E. Clinger, Bks 225, 8th Radio Sq, Brooks AFB, Tex.

FOURTEENTH AIR FORCE, CONAC

AF1MGP/4	Samuel H. Beverage, 20th Maint Sq (Ftr) (Jet), Shaw AFB, S. C.
AF2DVZ/4	Folmer W. Nissen, 37th Comm Sq, Robins AFB, Ga.
AF2KSY/4	Kenath C. Ivimey, 607th AC&W Sq, Turner AFB, Ga.
AF4ACA	Edwin B. Garrett, Morningside Drive, Brevard, N. C.
AF4ALW	Walde H. Nilsson, 409 West 64th Street, Savannah, Ga.
AF4BJE	William W. Neely, Forest Hills, Walterboro, S. C.
AF4BVE	Alan C. Hinshelwood, 1315 Ellison Road, Columbia, S. C.
AF4CNQ	Alton L. Erdman, 503 West Street, Montgomery, Ala.
AF4CQR	Elbert E. Jenkins, Jr., 543 East Mayfair Circle, Orlando, Fla.
AF4DTI	Guy N. Hardeman, Berry Field, Nashville, Tenn.
AF4FAD	Alabama ANG Station, c/o William E. Waldrup, 217A S.G. Hq Det, Birmingham, Ala.
AF4FUF	James J. Griffith, 735 Banner Avenue, Winston-Salem, N. C.
AF4GSF	Rinaldo A. Paladino, 1305 Brooke Avenue, Mobile, Ala.
AF4HNT	Wilson E. Roudebush, 4400 Glover Street, Rattlesnake, Fla.
AF4IKU	Seymour Strauss, 3046 SW. 19th Street, Miami, Fla.
AF4JBD	Gustave T. Karalow, USCG AR&SB, Elizabeth City, N. C.
AF4JRD	John A. Galbraith, P. O. Box 3, McNairy, Tenn.
AF4JV	Lucien A. Delson, 537 South 2d Street, Warrington, Fla.
AF4KGX	George J. Knowles, 300 South Bonham Road, Columbia, S. C.
AF4LPU	Hans H. Van Aller, Jr., 2 Kings Way, Springhill, Ala.
AF4MPW	Charles H. Fort, 37th Comm Sq, 14th AF, Robins AFB, Ga.
AF4MS	Edward J. Collins, 1003 East Blount Street, Pensacola, Fla.
AF4MSX	Frank A. Kellinger, 726 West Columbia, Orlando, Fla.
AF4MTP	Richard H. Mills, 930 West Harvard Avenue, Orlando, Fla.
AF4MXU	Clement R. Coggin, 1265 Yellow Hammer Drive, Mobile, Ala.
AF4NFO	Kenneth L. Garst, P. O. Box 117, Shaw AFB, Sumter, S. C.
AF4NFR	Joe H. Croft, Jr., BOQ 112, Greenville AFB, S. C.
AF4NGJ	Carl F. Hallberg, 130 East Orlando Avenue, Orlando, Fla.
AF4NGK	James Edgin, Maint Sq, Shaw AFB, Sumter, S. C.
AF4NLY	Lawrence R. George, 308th Ftr Sq Det 31st Ftr Gp, Turner AFB, Ga.
AF4NPZ	James T. Felder, Jr., 2025 Steiner Street, Mobile, Ala.
AF4NUJ	Eugene L. Mahoney, Bldg. 411D, Shaw AFB, S. C.
AF4NW	Harold P. Danforth, 105 West New Hampshire Avenue, Orlando, Fla.
AF4NXZ	Aaron T. Bowen, Jr., P. O. Box 74, Wrightsville Beach, N. C.
AF4OBK	Henry L. Kent, 3534 13th Avenue, Columbus, Ga.
AF4OCX	Harry P. Goodwin, RFD 2, Box 503, Pensacola, Fla.
AF4OJV	Earl R. Sheldon, Bldg. 88, Shaw AFB, S. C.
AF4OKA	David E. Reed, 712 Mainside Courts, Warrington, Fla.
AF4OOG	Richard L. Mauney, RFD 1, Mt. Holly, N. C.
AF4OQP	Dawson K. Hargrove, Shaw AFB, S. C.
AF4ORV	Forrest H. Hoppe, Bldg. 107, Shaw AFB, S. C.
AF4OVM	Ivan L. Homan, 1301 Clark Court, Murfreesboro, Tenn.
AF4PCA	William H. Minor, 3283 Vineville, Macon, Ga.
AF4PCS	John H. Richards, 403 SE. Syrcle Drive, Pensacola, Fla.
AF4PEC	Edgar S. Wright, 1 Forsyth, Knoxville, Ga.
AF4PFH	Robert C. O'Connor, 1026 East Fern, Tampa, Fla.
AF4PHC	Ernest O. Bonham, 113 Vinson Drive, Warner-Robins, Ga.
AF4PIM	Harvey J. Bramlett, Jr., 731 Lee SW., Atlanta, Ga.
AF4PKB	Edwin J. Young, 3-C Southland Avenue, Greenville, S. C.
AF4PLP	Raymond T. Brooks, 161st Tac Rcn Sq, Shaw AFB, Sumter, S. C.

AF4POK	Richard O. Davis, 113 Collins Street, Albany, Ga.
AF4PQH	William H. Schwartz, Jr., 1021 Bonita Street, Winter Park, Fla.
AF4PUR	George F. Ivey, Jr., 37th Troop Carrier Sq, Greenville AFB, S. C.
AF4SK	Aubrey R. Bates, P. O. Box 1656, Delray Beach, Fla.
AF4SO	Carroll S. Miller, 440 Westminster Avenue, Orlando, Fla.
AF4VMN	Edwin A. Matson, 520 West 63rd Street, Savannah, Ga.
AF5HKA	Lube B. Dodds, 1053 West Howard, Biloxi, Miss.
AF5MWM	Norman S. Ince, Bldg. 103, NATTC, Memphis, Tenn.
AF5OTC	Vernon E. Cook, 46 Defense Circle, Jackson, Miss.
AF5RFB	Keith R. McClinton, Box 2641, New Orleans 16, La.
AF9EOV	Robert E. Hurst, 2816 Mars Hill Avenue, Indianapolis, Ind.
AFØJUK/4	Bob K. Laschober, Robins AFB, Ga.
AFØOFJ/4	Herbert D. Maddox, 2456 Westover Drive, Winston-Salem, N. C.

AIR TRAINING COMMAND

AF1NXF/9	Robert G. Spinney, 2312 East Main Street, Belleville, Ill.
AF1SKA/5	Richard B. Saich, Jr., 3388th Trng Sq, Box 19, Keesler AFB, Miss.
AF2FTB/9	Phillip L. Bloom, 908 Lebanon Avenue Belleville, Ill.
AF2OXH/5	Charles Hasert, Cadet Gp, Goodfellow AFB, Tex.
AF3NSF/9	E. J. Harris, 3318 Trng Sq, Scott AFB, Ill.
AF3OGH/9	William O. Rutherford, 3328 Tech Tng Sq, 3310th Tech Tng Gp, Scott AFB, Ill.
AF3PBX/9	Richard O. Seaman, c/o General Delivery, Mahomet, Ill.
AF4MAK/5	James D. Sims, 3387th Trng Sq, Box 197, Keesler AFB, Miss.
AF4MXF	James W. Moore, 1109 North 6th Street, Nashville, Tenn.
AF4NVO/9	Harold B. Wade, Box 403, 3321st Trng Sq, Scott AFB, Ill.
AF4OAF/9	Harry S. Barrett, 3313 Tech Trng Sq, Scott AFB, Ill.
AF4OYT/5	John A. Peterson IV, 3404th Trng Sq (Radar), Box 88, Keesler AFB, Miss.
AF4RFO/9	George D. Greene, 3313th Tech Trng Sq, Box 20, Scott AFB, Ill.
AF5BVG	Oliver D. Gassett, 1716 Ethel Avenue, Waco, Tex.
AF5DHH	Arthur D. Maus, 1524 Speedway, Wichita Falls, Tex.
AF5DYN	Robert J. Fulwiler, 3000 Windsor Avenue, Waco, Tex.
AF5FAC	Lackland AFB Station, Lackland AFB, Tex.
AF5FAL	Biggs AFB Station, Biggs AFB, Tex.
AF5FAP	Ellington AFB Station, Ellington AFB, Houston, Tex.
AF5FAX	Connally AFB Station, Connally AFB, Waco, Tex.
AF5FAZ	Goodfellow AFB Station, Goodfellow AFB, Tex.
AF5FBE	Sheppard AFB Station, Sheppard AFB, Wichita Falls, Tex.
AF5FGW	Ray C. Crockett, 138 Washington Avenue, Ocean Springs, Miss.
AF5FZK	Clinton J. Keedy, Ever Breeze Trailer Court, Biloxi, Miss.
AF5GDV	Charles H. Redwine, 3107 Homan Street, Waco, Tex.
AF5GJ	Henry M. Harris, 2020 Trice Street, Waco, Tex.
AF5GML	Charles L. Cain, Radio Station KCNY, San Marcos, Tex.
AF5HJD	Charles W. Taucer, Presidio of San Francisco, Calif.
AF5IUW	Albert S. Williams, Jr., 3501 Standby Sq, Lubbock, Tex.
AF5JFE	Donald M. Mulcahy, Officers Mail Room, Box 295, Keesler AFB, Miss.
AF5KFN	Leo W. Kessinger, 514 South Roosevelt Street, Route 1, Enid, Okla.
AF5KWB	Marvin B. Blackburn, 204 Rolling Street, San Antonio, Tex.
AF5LES	Isaac E. Harrison, 407 West Hermine Blvd., San Antonio, Tex.
AF5LKI	James B. Sanders, Keesler AFB, Miss.
AF5LUL	Thomas T. Williams, 1315 College Avenue, South Houston, Tex.
AF5LUO	Elburn R. Oxner, 2106 Baylor Avenue, Waco, Tex.
AF5LYX	Eugene C. McLaughlin, 1617 N. 15A, Waco, Tex.
AF5MEU	John L. Mohn, 730 Patton Blvd., San Antonio, Tex.
AF5MLN	Robert Benson, 109 Belaire Street, San Angelo, Tex.
AF5MTO	Robert D. King, Goodfellow AFB, San Angelo, Tex.
AF5MTZ	Harvey L. Rutledge, 3329th Trng Sq, Keesler AFB, Miss.
AF5NGE	William D. Kennedye, 2323 C. Court, Enid, Okla.
AF5NOC	Allen E. Collier, 2404 Trng Sq (Radar), Box 440, Keesler AFB, Miss.
AF5NRM	Joe Melton, 168 Harrison Courts, Biloxi, Miss.
AF5NUI	Worth M. Speed, Ellington AFB, Tex.
AF5OEN	Archie W. Chatterley, Perrin AFB, Tex.
AF5OGM	Laverne E. Demler, Connally AFB, Waco, Tex.
AF5OJX	Ralph O. Goodwin, Keesler AFB, Miss.
AF5OKI	William W. Sanders, 3501st Standby Sq, Lubbock AFB, Tex.

AF5ORL	Robert C. Young, Hq & Hq Sq, 3700th ABG, Lackland AFB, Tex.
AF5ORW	Donald F. Brooks, Bldg. 10, Bks 11, Keesler AFB, Miss.
AF5PAH	Thomas J. Wheeler, 302 East Indiana Street, Enid, Okla.
AF5PDS	James S. Mays, Keesler AFB, Miss.
AF5PDW	Bascon E. Tillotson, Jr., Keesler AFB, Miss.
AF5PFA	Ron V. Allen, Goodfellow AFB, San Angelo, Tex.
AF5PGF	Joe H. Beler, Box 113, RFD 2, Biloxi, Miss.
AF5PHX	Lawrence O. Montgomery, Keesler AFB, Miss.
AF5PMD	Earl E. Adkins, OMR Box 42, Keesler AFB, Miss.
AF5PMN	Norbert B. Ostrye, Keesler AFB, Miss.
AF5PPU/9	John D. Hand, Jr., Scott AFB, Ill.
AF5PSQ	Donald E. Rose, 103 South Beverly Drive, Wichita Falls, Tex.
AF5PSW/9	Frederic C. Sqan, Hq ATRC, Scott AFB, Ill.
AF5PTP/9	Richard L. Igaz, 3321st Trng Sq, Scott AFB, Ill.
AF5PTT	George E. Fife, Jr., 3501st Standby Sq, Lubbock AFB, Tex.
AF5QBN	Thomas G. Sams, Keesler AFB, Miss.
AF5QBT	William U. Brownlow, Keesler AFB, Miss.
AF5QBU	Tom Brown, Jr., c/o A. L. Turner Co, McBurnett Bldg., San Angelo, Tex.
AF5QCM	R. A. Champagne, Keesler AFB, Miss.
AF5QDE	Wayne E. Biggs, 3501st Standby Sq, Lubbock AFB, Tex.
AF5QDI	Leonard F. Kier, General Delivery, Genoa, Tex.
AF5QDR/9	Legrand Sanderson, Hq Support Sq, ATRC, Scott AFB, Ill.
AF5QGH	Jack H. Bean, 26 Goodfellow Street, San Angelo, Tex.
AF5QGS	Aubrey Brock, Bldg. 142, Apt. 103, Reese AFB, Lubbock, Tex.
AF5QIL	John S. Forst, Apt. 3, Bldg. 16, Bld. 33, Keesler AFB, Miss.
AF5QIM/9	Lawrence E. Echelmeyer, Hq & Hq Sq, ATRC, Scott AFB, Ill.
AF5QJL	Thomas R. Martin, Keesler AFB, Miss.
AF5QKU	Donald L. Bartholomew, Box 47, 3388th Trng Sq, Keesler AFB, Miss.
AF5QLQ	Bob D. Fisher, 3315 Sq, Keesler AFB, Miss.
AF5QMD	Garland B. Hilton, 1201 7th Avenue, Texas City, Tex.
AF5QMH	Clarence Wolfe, Scott AFB, Ill.
AF5QNN	Foye L. Gentry, 3387th Trng Sq, Box 110, Keesler AFB, Miss.
AF5QOQ	John H. Parrott, Jr., Bldg. 12, Blk 34, Apt. 4, Keesler AFB, Miss.
AF5QOR	Thomas M. Ingling, 1643 Oaklawn Place, Biloxi, Miss.
AF5QPT	Kenneth N. Harding, 520 23d Street, Gulfport, Miss.
AF5QVT	Jack C. Moore, Trailer Court, Randolph Field, Tex.
AF5QWN	Herbert J. Edwards, 4008 Homan Avenue, Waco, Tex.
AF5QYW/9	Graydon K. Eubank, 619 West Schuetz, Lebanon, Ill.
AF5QYX	John F. Jackson, 3315 Sq, Keesler AFB, Miss.
AF5QZT	Willard C. Wiley, 412 West Beach Street, Biloxi, Miss.
AF5RAQ	Ron L. Richardson, 3405th Trng Sq (Radar), Keesler AFB, Miss.
AF5RAY/9	James B. Stanphill, 4516 West Main Street, Belleville, Ill.
AF5RBS	Allison S. Perry, Jr., 3401st Tng Sq (Radar), Box 1909, Keesler AFB, Miss.
AF5RGY	Eugene J. Pollock, 810 Allendale Avenue, Gulfport, Miss.
AF5RKO	Bert L. Tinius, 314 Lee Street, Biloxi, Miss.
AF6AAF	Mather AFB Station, Mather AFB, Sacramento, Calif.
AF6BCY/5	John C. Hallyburton, 3608 Garfield Street, Wichita Falls, Tex.
AF6DUS/9	Larry E. Vandre, 3323 Tech Trng Sq, Scott AFB, Ill.
AF6FNE/9	John A. McKowen, 3314th Trng Sq, Scott AFB, Ill.
AF6FYB	Henry E. Guttmann, Mather AFB, Calif.
AF6HHC	Edward D. Connor, Jr., Mather AFB, Calif.
AF6HMB	Arnold Ross, 3537th Maint Sq, Mather AFB, Calif.
AF6HML	William M. Jackson, RFD 7, Box 1024A, Sacramento, Calif.
AF6HUC	Bertrand D. Johnson, P. O. Box 5430, Mather AFB, Calif.
AF6HWP	Everette P. Reeves, 3537th Maint Sq, Mather AFB, Calif.
AF6ICB	Donald F. Lafferty, 4300 Maple Street, Sacramento, Calif.
AF6IGR/9	Russell E. Casey, 3313th Trng Sq, Scott AFB, Ill.
AF6ULE/9	Franklin R. Williams, 3328th Trng Sq, Scott AFB, Ill.
AF7FAL	Williams AFB Station, Williams AFB, Chandler, Ariz.
AF7ILE/9	Norris Bundy, 3310th Tech Trng Wg, Scott AFB, Ill.
AF7KUP	Alfred L. Sypnus, 2112 Cedar Street, Las Vegas, Nev.
AF7LMN	James W. Blaine, 411 South Second Street, Las Vegas, Nev.
AF7LQQ	Roy W. Brentlinger, 1213 North Fifth Street, Las Vegas, Nev.
AF7LSR/6	Elmer B. Slaughter, 3537th Maint Sq, Mather AFB, Calif.
AF7MDL	William L. Jones, Bldg. T-1203, Williams AFB, Chandler, Ariz.
AF7NFX	Robert E. Winters, Bldg. 599, Apt. 4, Las Vegas, Nev.
AF7NVY/6	Arthur W. Weart, 3536 Maint Sq, Mather AFB, Calif.

AF7OAJ	Charles K. Kurtz, 350 Oxford Street, North Las Vegas, Nev.
AF7OGE	Robert Lunderville, 1815 Glider Street, North Las Vegas, Nev.
AF7OJM	Casper H. Neururer, 2015 East Lincolnway, Cheyenne, Wyo.
AF9AIR	Hq ATRC Station, Scott AFB, Ill.
AF9BMM	William H. Applegate, 602 North Cunningham, Urbana, Ill.
AF9BPK	Charles D. Centers, Q–237–C, Scott AFB, Ill.
AF9CIR	Jessie J. Harton, Hq & Hq Sq, Trng Div, ATRC, Scott AFB, Ill.
AF9CJE	Joseph A. Dube, NCO Trailer Camp, Scott AFB, Ill.
AF9CPR	James A. Fuller, 116 North 44th Street, Belleville, Ill.
AF9CQK	Thomas R. Reed, 1918th AACS Sq, (MATS), Scott AFB, Ill.
AF9DEC	Leslie L. Canfield, P. O. Box 270, Belleville, Ill.
AF9DFC	George S. Walborn, 34 North Douglas, Belleville, Ill.
AF9FAE	Scott AFB Station, Scott AFB, Ill.
AF9FAI	Dept of Officers Comm Station, Scott AFB, Ill.
AF9FGR/Ø	Earle G. Dare, Jr., 14000 East Colfax Avenue, Aurora, Colo.
AF9FOU	Wayne O. Brewer, 906 South 11th Street, Belleville, Ill.
AF9FUW	John L. Hayes, RFD 2, Box 269, Belleville, Ill.
AF9GNK	Robert M. Jenni, 204 A, South 34th Street, Belleville, Ill.
AF9GPN	Maurice A. Rundquist, RFD 1, Lebanon, Ill.
AF9GZF	James M. Hildum, 3314th Trng Sq, Scott AFB, Ill.
AF9HMV	Warren A. Fackenthall, 181 North B Street, Scott AFB, Ill.
AF9HOM	Vernon G. Carver, 6053 South Major Avenue, Chicago 28, Ill.
AF9HTD	Ralph N. Hardin, 223 North 74th Street, Belleville, Ill.
AF9HVW	Howard H. McDaniel, 516 North Penfield, Rantoul, Ill.
AF9IPI	George R. Holbert, 313 North Lincoln, O'Fallon, Ill.
AF9IQO	Loren E. Somes, 213 Kretschmer, Belleville, Ill.
AF9JAC	Henry A. Johnston, Jr., 209E Church Street, Mascoutah, Ill.
AF9JDB	Walter G. Appel, 11 Lincoln Blvd., Mascoutah, Ill.
AF9JDX	George E. Straub, 612 Center Street, Lebanon, Ill.
AF9JKS	Donald M. Davis, 315 North 5th Street, Belleville, Ill.
AF9JRM	Orville G. Bliesner, 123 St. Louis Road, Collinsville, Ill.
AF9JTJ	Anthony J. Verboys, 507 East A Street, Belleville, Ill.
AF9JTR	James H. Tillery, 203 Fourth Avenue, Edwardsville, Ill.
AF9JXM	Lloyd A. Robblin, 107 North Michigan Avenue, Belleville, Ill.
AF9KIA	Paul E. Jameson, Sr., 2824 Myrtle Avenue, Granite City, Ill.
AF9NSD	John O. Copley, Jr., 2926 Mary Irene Street, Belleville, Ill.
AF9PJF	Paul Swearingen, 700 South Jackson, Belleville, Ill.
AF9QDW	Clarence G. Ornduff, BOQ 902, Scott AFB, Ill.
AF9QEO	Herbert J. Tye, 1227 County Road, Mascoutah, Ill.
AF9RZI/5	Jack F. Holt, 3315th Trng Sq, Box 3, Keesler AFB, Miss.
AF9YMD	Fred W. Ronnermann, 4th Area Officer's Trailer Park, Scott AFB, Ill.
AFØAEL	Raymond R. Rath, 2649 South Acoma Street, Denver, Colo.
AFØBAX/5	Alfred C. Dille, 1600 West Howard Avenue, Biloxi, Miss.
AFØCXW	Taylor S. Shreve, 1230 Valentia Street, Denver, Colo.
AFØHKN	Donald D. Dory, 941 20th Street, Des Moines, Iowa
AFØJHM	Durwood W. Hunt, 507 Downing Street, Denver, Colo.
AFØLMW/9	Leo C. Stewart, Officer's Trailer Camp, 4th Area, Scott AFB, Ill.
AFØTJI/5	Russell S. Hedges, 1731 Henley Avenue, St. Croix Beach, Stillwater, Minn.
Opr Lic	William E. Bettis, 1811 7th Street, Wichita Falls, Tex.

STRATEGIC AIR COMMAND

AF1KSF/5	Norris J. Ansell, 813 North Lea, Roswell, N. Mex.
AF1RKL/7	Albert J. Van Deventer, 2d Air Refueling Sq, Davis-Monthan AFB, Tucson, Ariz.
AF2FGO/5	Stuart D. Scott, Det 1900–4 AACS Sq, Roswell, N. Mex.
AF2LBG/6	Daniel H. Papp, 1901 T Street, Merced, Calif.
AF2LNG/6	Robert L. King, 93d Comm Sq, Castle AFB, Calif.
AF2ZBZ/6	Louis Fusari, 33d Bomb Sq, 22d Bomb Gp, Riverside, Calif.
AF3OGK/4	Thomas A. Siedlecki, 189–A, MacDill AFB, Fla.
AF4CRA	Dexter W. Phillips, 3411 Emperado, Tampa 9, Fla.
AF4EFG	Joseph D. Andrew, MacDill AFB, Fla.
AF4FAJ	Chatham AFB, Station, Chatham AFB, Savannah, Ga.
AF4KJN	Clyde L. Mings, 4278 Columbus Circle, Tampa 6, Fla.
AF4MTO	Kenneth E. Trout, Hq 307th Bomb Gp, MacDill AFB, Fla.
AF4MWQ	Martin L. Wheeler, 1014 Marion Avenue, Lakeland, Fla.
AF4NLL	James W. Wray, Quarters 146–A Gadsden, MacDill AFB, Fla.

AF4NNB/0	Gilbert P. Kearns, Bldg. 352, Apt. C, Topeka AFB, Kans.
AF4NQI/5	Harvey L. Poff, Jr., 2620 Foster Street, Bossier City, La.
AF4OIS/5	Charles A. Spain, 126 East Pear, Roswell, N. Mex.
AF4PLQ/6	Roy L. Lewis, 1907 AACS Sq, March AFB, Calif.
AF4PNW	Robert L. Wilson, 2149 Tennessee Avenue, Savannah, Ga.
AF4RTU	Hurshel J. Cawvey, Apt. 165, Gadsden Homes, MacDill AFB, Fla.
AF4ZZE	Rhea S. Johnson, Westshore Blvd. & Paul Street, Rattlesnake, Fla.
AF5AIR	Hq 2d Air Force Station, Barksdale AFB, La.
AF5CTP	William D. Ready, Box 701, Walker AFB, Roswell, N. Mex.
AF5DIJ	Malcolm D. Rains, 509th Maint Sq, Walker AFB, N. Mex.
AF5FAB	Walker AFB Station, Walker AFB, Roswell, N. Mex.
AF5FAT	7th Bomb Wg Station, Carswell AFB, Fort Worth, Tex.
AF5HFB	Lynn A. Breece, 106 Avenue D West, Barksdale AFB, La.
AF5JVW	William D. Pickett, 2d Street, Orchard Park, Dexter, N. Mex.
AF5LIJ	Joseph H. Hearne, 907 South Brazos Street, Weatherford, Tex.
AF5MBJ	H. K. Baisley, 305 Avenue B West, Barksdale AFB, La.
AF5MJA/2	Manford E. Short, McGuire AFB, Wrightstown, N. J.
AF5MMU	William E. Peterson, 3111 Carnation Street, Fort Worth, Tex.
AF5MZJ	Norman W. Harris, 810 West Tilden Street, Roswell, N. Mex.
AF5NAN/6	Henry H. Magee, 245A 20th Street, Merced, Calif.
AF5OGR	William J. Fulmer, 1020 South Lea, Roswell, N. Mex.
AF5ONA	Ludvig B. Liljeroos, 312 Rowland Drive, Fort Worth, Tex.
AF5OXB	Hugh C. Johnson, 1928th AACS Sq, MacDill AFB, Fla.
AF5OYB	Charles A. Suderno, Walker AFB Trailer Park, Trailer #27, Roswell, N. Mex.
AF5PFR/6	George W. Chandler, 2410 Chicago Avenue, Riverside, Calif.
AF5PGR	Charles P. Skouras, 312 West 1st Street, Roswell, N. Mex.
AF5PGW	Asa T. Adams
AF5PJK	LaRue D. Rexroat, House #26, Walker AFB, Roswell, N. Mex.
AF5PLT	Clarence S. Irvine, Quarters 960, Walker AFB, Roswell, N. Mex.
AF5PQK	Edward O. Harrison, BOQ 820, Walker AFB, Roswell, N. Mex.
AF5PSC	Elmer E. Felio, 1721 North Ohio Aveune, Roswell, N. Mex.
AF5PZK	David Prado, 1212 South Sherman, Roswell, N. Mex.
AF5QBG	Jerald R. Malone, 1705 South Monroe, Roswell, N. Mex.
AF5QEK	Deleaun Rester, 3820 Oak Lawn Drive, Fort Worth, Tex.
AF5QFY	George J. Poland, 7th Comm Sq, 7th ABG, Carswell AFB, Tex.
AF5QLC	Walter D. Hale, Carswell AFB, Tex.
AF5QOM	Robert C. Borom, 1107 South Main, Roswell, N. Mex.
AF5QOO	Ralph W. Walker, 1725 North Missouri Street, Roswell, N. Mex.
AF5QPC	William C. Hatfield, 206½ East Mathews, Roswell, N. Mex.
AF5QQA	Harold E. LaMarche, 25 Orchard Park, Roswell, N. Mex.
AF5QQB	William C. LaRue, Bldg. 424–B, Walker AFB, Roswell, N. Mex.
AF5QQR	Russell W. Garlow, 2523 22d Street, Topeka, Kans.
AF5QQS	Hans G. Heuttig, 500 South Kansas, Roswell, N. Mex.
AF5QQZ	William E. Thackham, 606 East 2d Street, Roswell, N. Mex.
AF5QXF	Mervil L. Dodson, 308 South Main Street, Weatherford, Tex.
AF5QXI	Almas C. Williams, 3221 Evans Avenue, Fort Worth, Tex.
AF5QXP	William W. Kastilahn, 1152 Gilbert Drive, Bossier City, La.
AF5QYB	Roy E. Kaden, 1144 Gilbert Drive, Bossier City, La.
AF5QYC	Leonard R. Russell, 509th Bomb Wg (M), Walker AFB, Roswell, N. Mex.
AF5QYF	Glenn J. McGaffigan, 416 East 3d Street, Roswell, N. Mex.
AF5QZO	Gaetano Migliori, K2 Greentree, Dayline, La.
AF5RAA	Vern D. Tilden, 509th Comm Sq, Walker AFB, Roswell, N. Mex.
AF5RBD	Charles E. Barnhill, 1003 Kings Drive, Roswell, N. Mex.
AF5RBU	Don A. Coleman, Orchard Park, Apt. 1, Roswell, N. Mex.
AF5RDP	Norman D. Johnson, 1606 West Walnut, Roswell, N. Mex.
AF5REK	Stanley O. Andrews, 1518 Ullrich Avenue, Austin, Tex.
AF5RHM	Walter J. Newton, 303 1st Street, Barksdale AFB, La.
AF5RKV	William R. Whittington, Walker AFB, N. Mex.
AF6COS	Arthur F. Calabro, 93 Patton Court, Riverside, Calif.
AF6FAG	March AFB Station, March AFB, Riverside, Calif.
AF6FAL	Fairfield-Suisun AFB Station, Fairfield-Suisan AFB, Fairfield, Calif.
AF6FDB	Eugene B. Driskell, 2107 Main, Riverside, Calif.
AF6FXG	Lloyd D. Berent, 93d Comm Sq, Castle AFB, Calif.
AF6GEH	Stanley J. Gier, Hq & Hq Sq, 93d Bomb Wg, Castle AFB, Calif.
AF6GSM	Harold C. Fisher, 246 22d Street, Merced, Calif.
AF6GWT	Richard H. Baker, 1320 5th Avenue, Atwater, Calif.
AF6GZD	Marlo V. Kiff, 1710 Webster Street, Redlands, Calif.

AF6HHW	Paul E. Chambers, 1240 Randolph Street, Napa, Calif.
AF6HRD	Donald L. Van Ausdeln, Bldg. T-319, Fairfield-Suisun AFB, Calif.
AF6IBR	Walter N. Hunter, 2184 Parrish Avenue, Napa, Calif.
AF6ITL	Lyle B. Clemans, 3590 Myers, Arlington, Calif.
AF6NJZ	Albert W. Stone, 1st Maint Sq, March AFB, Calif.
AF6RVO/7	Charles D. McFeeley, Bldg. 517A, George Wright AFB, Spokane, Wash.
AF6SMU	Theodore W. Rast, 1695 Union Street, Merced, Calif.
AF6UVM/7	Herman J. Hoechstetter, RFD 1, Medical Lake, Spokane, Wash.
AF6WEM	James A. Johnston, Public Quarters 208, March AFB, Calif.
AF6WWD/7	William R. Arcos, 3344th Bomb Sq, Spokane AFB, Wash.
AF6YXG	Donald W. Harsin, 28th Maint Sq, Rapid City AFB, S. Dak.
AF7FAG	43d Bomb Wg (M) Station, Davis-Monthan AFB, Tucson, Ariz.
AF7HQE	George M. Janssen, 2928 North Lacey, Spokane, Wash.
AF7KUN	Edmond L. Bouton, Jr., 556 South Wilson Avenue, Tucson, Ariz.
AF7KYJ	Milton Frank, Jr., Hq 43d Bomb Gp (M), Davis-Monthan AFB, Tucson, Ariz.
AF7LAK	Ralph E. Lukensmeyer, 144 East District Street, Tucson, Ariz.
AF7LRG	Sidney A. Lundstrom, 5138 East Pima Avenue, Tucson, Ariz.
AF7MED	James E. Schulenberg, 1107 East Lowell Avenue, Tucson, Ariz.
AF7MMD	Hubert Smith, Jr., 3102 East 24th Street, Tucson, Ariz.
AF7MXZ	James C. Critchfield, 218 West Longfellow Blvd., Spokane, Wash.
AF7MZC/6	John P. Camp, Jr., RFD 1, Box 214, Perris, Calif.
AF7NBM	Cloyd A. Taylor, Jr., 3504 West 2d Avenue, Spokane, Wash.
AF7NQW	Glenn J. Friesen, 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NQX	David W. Godby, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NQY	Harry W. Greenstreet, 43d Air Refueling Sq, Davis-Monthan AFB, Ariz.
AF7NRC	John J. Blangio, 519 Roskruge Avenue, Tucson, Ariz.
AF7NRE	Morris, D. Alsman, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NRL	William H. Whitehead, Jr., 63d Bomb Sq, 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NRM	Franklin L. Talley, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NRO	Calvin L. Stout, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NRT	Bobby R. Paden, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NRX	Bobbie L. Tew, Hq 43d Bomb Gp (M), Davis-Monthan AFB, Ariz.
AF7NTR	Jerome J. Rubinson, 1804 East Broadway, Tucson, Ariz.
AF7NWN	Howard C. Tidwell, 72d Strat Rcn Sq, Mountain Home AFB, Idaho
AF7NXR	Terrance L. O'Hearn, East 1807 2d Avenue, Spokane, Wash.
AF7OCD	Earl E. Chase, East 3917 5th Avenue, Spokane, Wash.
AF7OEL	Norman C. Threewitt, 3231 West 14th, Spokane, Wash.
AF7OFQ	Donald J. Goode, 125 West Illinois Avenue, Tucson, Ariz.
AF7VOZ	William A. Lentz, Jr., 64th Bomb Wg, 43d Bomb Gp, Davis-Monthan, AFB, Ariz.
AF8EMJ/Ø	Jane Kohlmorgan, 1911th AACS sq, Offutt AFB, Nebr.
AF8PKQ/7	Charles W. Golden, Bldg. 106, George Wright AFB, Spokane, Wash.
AF8UYF/6	Raymond P. Zettler, 33d Bomb Sq, March AFB, Calif.
AF8ZBQ/4	Robert A. Hockin, 3302 San Jose Street, Tampa 9, Fla.
AF9DJR/Ø	James H. Kyes, 115 St. Andrews Street, Rapid City, S. Dak.
AFØAAQ	Walter J. Melko, 3 Ruggles Road, Rapid City, S. Dak.
AFØADM	Christopher G. Boehm, 14 St. Patrick, Rapid City, S. Dak.
AFØAEG	James E. Pallas, Jr., Air Base Trailer Village, Rapid City, AFB, S. Dak.
AFØAGK	William B. Watson, Hq 28th Bomb Gp, Rapid City, AFB, S. Dak.
AFØAIJ	George H. Clark, 717 Bomb Sq (H), 28th Bomb Gp (H), Rapid City AFB, S. Dak.
AFØAIR	Hq SAC Station, Offutt AFB, Omaha, Nebr.
AFØAIT	Arthur K. Slagle, 320 St. Andrews Street, Rapid City, S. Dak.
AFØAPT	Lawrence P. Phillips, 1358 North Pine Street, Wahoo, Nebr.
AFØASQ	Leland F. Gerber, 1822 West St. Joseph, Rapid City, S. Dak.
AFØAST	James T. Murphy, 530th Av Sq, Rapid City AFB, S. Dak.
AFØDKD	Francis T. Wiater, Platte Center, Nebr.
AFØETD/6	Jack M. Decker, 272 Cunningham Ct, Riverside, Calif.
AFØFAB	Smoky Hill AFB Station, Smoky Hill AFB, Salina, Kans.
AFØFAL	28th Bomb Wg Station, Rapid City AFB, S. Dak.
AFØFAN	30th Comm Sq Station, Offutt AFB, Omaha, Nebr.
AFØOGQ	Van L. Corzine, 202 St. Andrews Street, Rapid City, S. Dak.
AFØPK	Lawrence J. Israel, 1622 East Dale Street, Colorado Springs, Colo.
AFØQBK	Willis A. Duncan, 713 Minnelusa Drive, Rapid City, S. Dak.
AFØRHU	Henry E. Matson, 2833 South 35th Street, Omaha, Nebr.
AFØRIK	Charles J. Hartman, 109 West 18th Street, Bellevue, Nebr.
AFØRPA	Harold E. Dutton, General Delivery, Weaver, S. Dak.

AFØRVD	Robert W. Clark, 30th Comm Sq, Offutt AFB, Omaha, Neb.
AFØSQK	Harrison A. Lehmann, 836 Lake Avenue, Colorado Springs, Colo.
AFØWTY	Henry E. Tattice, 610 West 22d Street, Bellevue, Nebr.
AFØYGQ/6	Ulice W. Jines, Sunnymead Cts, Sunnymead, Calif.
AFØZBO	James R. Sharp, Jr., 1308 Hancock Street, Bellevue, Nebr.
AFØZLA	Raymond E. Domke, P. O. Box 54, Mead, Nebr.
AFØZRD	Johnson A. Nye, Bldg. T-6409, Rapid City, AFB, S. Dak.
AK7ZC/AF7	Charles W. Heringlake, 4217 Irving Circle, Tucson, Ariz.

AIR MATERIEL COMMAND

AF1PUL/8	Richard A. Johnson, Thomas Trailer Court, Osborn, Ohio.
AF3IJF	Milford C. Gossard, 97 East Lane, Pine Ford Acres, Middletown, Pa.
AF3NLY	Wallington D. Diehl, Jr., 5 Hoffer Street, Middletown, Pa.
AF3PVW	John F. Payne, 18 Sycamore Lane, Middletown, Pa.
AF4FAS	Brookley AFB Station, Brookley AFB, Mobile, Ala.
AF4ITI	Charles C. Neely, MOAMA, Brookley AFB, Mobile, Ala.
AF4LLM/5	Ivan L. Strawser, 4501 South High, Oklahoma City, Okla.
AF4LPR/5	Ray A. Johns, 554 East Indian Drive, Midwest City, Okla.
AF4LSW/5	Edgar D. Eno, 109 West Turnbull, Midwest City, Okla.
AF4MWS	Henry Lang, 504 MacArthur Blvd., Robins AFB, Ga.
AF4OEB/5	Emitt C. Owen, 118 North McKinley, Shawnee, Okla.
AF4RHL	Anderson G. Brannon, 1258th Air Transport Sq, 1703d AT Gp, Brookley AFB, Ala.
AF5CBS	Glover B. Brock, Tinker AFB, Okla.
AF5LWO/8	Jim G. Ford, Wright-Patterson AFB, Dayton, Ohio.
AF5MGO	William F. Fortuen, Jr., 336 Park Place, San Antonio, Tex.
AF5MTS	Chester B. Lewis, Kelly AFB, San Antonio, Tex.
AF5NEG	Edwin N. Myers, 2059th Air Wea Wg, Tinker AFB, Okla.
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AF5ONN	Herbert G. Markley, Bldg. 661-A, Holloman AFB, Alamogordo, N. Mex.
AF5QBJ	John E. Fisher, 538 East Indian Drive, Midwest City, Okla.
AF5QEE	Nelson H. Karrer, 2026 South Stanford Drive, Oklahoma City, Okla.
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AF5RJA	William D. Pearson, Box 38, Holloman AFB, N. Mex.
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AF6FZN	James G. Towsend, 613¼ West 43d Place, Los Angeles 37, Calif.
AF6GSC	William M. Brotzman, 4737 SE. 27th Street, Oklahoma City, Okla.
AF6HOP	Wesley T. Calkins, McClellan AFB, Calif.
AF6HRN	Marion R. Graham, 2270 Blake Street, San Bernardino, Calif.
AF6VFR	Ursel C. Nolte, RFD 1, Box 224, Lancaster, Calif.
AF7LUH/4	Walter H. Squires, Sferics Station, Wea Det 25-8L, Robins AFB, Ga.
AF8AIR	Hq AMC Station, Wright-Patterson AFB, Dayton, Ohio.
AF8AWL	Jack G. Anderson, 27 Mann Avenue, Osborn, Ohio.
AF8BCG	Howard T. Hart, 710 Smith Street, Xenia, Ohio.
AF8CAS	Edmond A. Niccolini, 131½ North Florence, Springfield, Ohio.
AF8DAO	David G. Simons, 2749 School Drive, Dayton 5, Ohio.
AF8DGG	Charles E. Hall, 216 Weaver Street, Xenia, Ohio.
AF8DLK	Walter F. Burch, 104 East Xenia Drive, Osburn, Ohio.
AF8DTR	Francis S. Dunn, 2433 Ravenwood Avenue, Dayton 6, Ohio.
AF8ENR	Orville E. Lietzke, 311 Hillside, Skyway Park, Fairborn, Ohio.
AF8ESF	Walter C. Ockoskis, 394 Ridge Place, Fairborn, Ohio.
AF8FV	Earle Robert O'Connell, 4805 Ross Avenue, Dayton, Ohio.
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AF9JZI/4	Frederic H. Stone, Jr., 1258th AT Sq, 1703d AT Gp, Brookley AFB, Ala.
AF9OVM/3	Donald C. Maier, Hq 1912 AACS Sq, Olmstead AFB, Middletown, Pa.
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AFØZSO	Elvin D. Reamey, 3521 East 29th Avenue, Denver, Colo.
AG6DP/AF5	Salmon B. Chase, 2078th Air Wea Rcn Sq, Tinker AFB, Okla.

AIR UNIVERSITY

AF2MPG/4	Mario E. Niccolini, Quarters 428–C, Gunter AFB, Ala.
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AF4FAC	Gunter AFB Station, Gunter AFB, Ala.
AF4FAG	3480th AU Wing Station, Craig AFB, Ala.
AF4FAU	Hq AIR U Station, Maxwell AFB, Ala.
AF4HWW	Robert C. Sexton, Quarters 223A, Gunter AFB, Ala.
AF4JYB	Frederick L. Moore, Quarters 435, Maxwell AFB, Ala.
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AF4KUK	Felix M. Marshall, Quarters 317–C, Gunter AFB, Ala.
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AF4LVO	William B. Deane, Quarters 406–C, Gunter AFB, Ala.
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AF4OUG	David E. Myers, 16 B Victory Circle, Panama City, Fla.
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AF4PYU	George P. Pullen, Craig AFB, Ala.
AF4QCI	Bruce W. Gillanders, Quarters 705–D, Gunter AFB, Ala.
AF4RDY	Charles W. Jones, Craig AFB, Ala.
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AF4TQB	John E. Frizen, MOQ 406–A, Gunter AFB, Ala.
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AF4YET	John W. R. Johnson, MOQ 158–C, Craig AFB, Ala.
AF7MWG/4	Blair C. Baylor, Gunter AFB, Ala.
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AIR PROVING GROUND

AF4JYK	Guy H. Rockey, 46 Shalimar Drive, Shalimar (P. O. Box 223), Fla.
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AF4OJO	Thomas B. Barnes, 3200 Electronics Test Sq, Eglin AFB, Fla.
AF4RDW	Eugene G. Crepeau, Plew Hgts., Eglin AFB, Fla.
AF9QDL/4	Edward C. Tietz, Hq & Hq Sq, APG, Eglin AFB, Fla.

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SANDIA BASE

AF5QAU	Malcolm A. Hormats, Det B, 1100th SRG, Box 5500, Albuquerque, N. Mex.
AF5QWF	William M. Hayward, 1100th SRG, Albuquerque, N. Mex.
AF5QWX	William P. Legg, Sandia Base, N. Mex.

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AF1SOP	Kenneth G. Barzee, 93 Stuart Street, Springfield, Mass.
AF1VQG	Edward E. Bernfeld, 194 Bond Street, New Britain, Conn.
AF3AUH	Stan S. Witowski.
AF3DND	Howard N. Detrick, 2114 R Street NE., Washington 2, D. C.
AF3FMC	Hq AACS Station, Andrews AFB, Washington 25, D. C.
AF3PIZ	James R. Lucid, Apt. 1, Bldg. 1–61, Andrews AFB, Washington 25, D. C.
AF3PJR	George F. Taylor, Hq AWS, Andrews AFB, Washington 25, D. C.
AF3STT	Raymond J. Forrester, 3109 Parkway Terrace Drive SE., Washington, 20, D. C.
AF4EVG	William S. Dawson.

AF4REP	Charles R. Heinhorst, 343 Jefferson Avenue, Alexandria, Va.
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AFØZIR/5	Joe B. Welborn, Hq 1802d AACS Gp, Kelly AFB, San Antonio, Tex.

NEWFOUNDLAND BASE COMMAND

AK2AP	John R. Henthorn, APO 863, c/o Postmaster, New York, N. Y.
AK2CO	Caspter R. Offringa, APO 863, c/o Postmaster, New York, N. Y.
AK2DB	Dominic A. Bartol, APO 862, c/o Postmaster, New York, N. Y.
AK2DS	David T. Stockslager, APO 863, c/o Postmaster, New York, N. Y.
AK2DW	Harry W. DeWald, APO 862, c/o Postmaster, New York, N. Y.
AK2DZ	David P. Kettlewell, APO 677, c/o Postmaster, New York, N. Y.
AK2EF	Edward E. Fraters, APO 863, c/o Postmaster, New York, N. Y.
AK2FL	George D. Meserve, APO 862, c/o Postmaster, New York, N. Y.
AK2FP	William F. Phillips, APO 863, c/o Postmaster, New York, N. Y.
AK2GG	Gregory C. Gressell, APO 677, c/o Postmaster, New York, N. Y.
AK2HS	Harold S. Hicks, APO 862, c/o Postmaster, New York, N. Y.
AK2HW	Leslie H. Wells, APO 863, c/o Postmaster, New York, N. Y.
AK2JR	John E. Russell, APO 863, c/o Postmaster, New York, N. Y.
AK2JS	John T. Sowers, APO 440, c/o Postmaster, New York, N. Y.
AK2LF	Louie L. Felton, APO 858, c/o Postmaster, New York, N. Y.
AK2LW	Harry J. Wills, APO 863, c/o Postmaster, New York, N. Y.
AK2MD	J. A. Schindler, APO 862, c/o Postmaster, New York, N. Y.
AK2MO	Victor B. Keehner, APO 862, c/o Postmaster, New York, N. Y.
AK2PN	Phillip N. Dunham, APO 859, c/o Postmaster, New York, N. Y.
AK2RG	Ray B. Gravitt, APO 864, c/o Postmaster, New York, N. Y.
AK2WP	William M. Pennington, APO 862 c/o Postmaster, New York, N. Y.
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AK7ABJ	Sylvan E. Yates, Bldg. T3185, Davis AFB, Adak Island, Alaska.
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AK7UVW	Norman E. Zielinski, APO 731, c/o Postmaster, Seattle, Wash.
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AH4JO	Charles W. Anderson, Quarters 223A, Ramey AFB, Puerto Rico.
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AH4KO	Edward L. Thompson, 5900th M&S Sq, APO 845, c/o Postmaster, New York, N. Y.
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AH5WP	Walter B. Packard, Albrook AFB, Canal Zone.

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AI1AC	D. E. Field, 527th AC&W Gp, APO 929, c/o Postmaster, San Francisco, Calif.
AI1AD	H. S. Stees, Jr., Hq 5th Air Force, APO 710, c/o Postmaster, San Francisco, Calif.
AI1AE	W. T. Winter, 49th Comm Sq, APO 919, c/o Postmaster, San Francisco, Calif.
AI1AF	FEAF NCS, Hq FEAF, APO 925, c/o Postmaster, San Francisco, Calif.
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AI1AJ	E. V. Johns, 527th AC&W Gp,.APO 929, c/o Postmaster, San Francisco, Calif.
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AI1AN	F. T. Horn, 8th Comm Sq, APO 929, c/o Postmaster, San Francisco, Calif.
AI1AO	N. F. Sendelbach, 7th Comm Sq. APO 994, c/o Postmaster, San Francisco, Calif.
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AI2AI	William L. Hendren, Hq & Hq Sq, 20th AF, APO 239, c/o Postmaster, San Francisco, Calif.
AI2AJ	Frank M. Lopes, 20th Air Force, APO 239, c/o Postmaster, San Francisco, Calif.
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AI3AD	K. L. Chapman, Hq & Hq Sq, 13th Air Force, APO 74, c/o Postmaster, San Francisco, Calif.
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Opr Lic	W. M. Ritter, 14th Comm Sq, APO 74, c/o Postmaster, San Francisco, Calif.
Opr Lic	M. J. Weitzman, 67th Ftr Sq, APO 74, c/o Postmaster, San Francisco, Calif.

FREE TERRITORY OF TRIESTE

To assist DX operators in keeping up with Americans abroad, lists of amateurs in foreign countries will be published as they become available.

AMERICAN MILITARY (1 KILOWATT)

AG2AA	Robert A. Smith, 7183d Sig Sv Co, APO 209, c/o Postmaster, New York, N. Y.
AG2AC	Amateur Station Custodian, 7183d Sig Sv Co, APO 209, c/o Postmaster, New York, N. Y.
AG2AD	USAFE Liaison Section, Hq TRUST, APO 209, c/o Postmaster, New York, N. Y.
AG2AG	Stanley L. James, Jr., Signal Section, Hq TRUST, APO 209, c/o Postmaster, New York, N. Y.

BRITISH MILITARY (150 WATTS)

MF2AA	M. H. R. Carragher, Villa Arra, Via Fabio Severo, Trieste.
MF2AB	RAF Liaison Officer, Hq BETFOR, Trieste.
MF2AC	D. G. Watkins, British Army Broadcasting Station, Trieste.

TRIESTE INHABITANTS (150 WATTS)

I1DI	Nardin Guido, Via Sottoripa 8, Trieste.
I1FR	Romanin Aldo, Via Francesco 2, Trieste.
I1MK	Horn prof dott Gualtiero, Via Virgilio 15, Trieste.
I1ML	Candussi dott Guido, Salita Promontorio 11, Trieste.
I1MV	De Filippi Giulio, Via Carsia 9 (Villa Opicina), Trieste.
I1NU	Ortensio Roberto, Via Enrico Toti 4, Trieste.
I1RC	Camuali Giovanni, Strada Guardiella 29, Trieste.
I1ACM	Nigris Mario, Via Kandler 7, Trieste.
I1ADM	Ostan dott Isidoro, Via Locchi 2, Trieste.
I1AJR	Sapienza Giorgio, Via Fabio Severo 76, Trieste.
I1AOR	Godec Massimiliano, Scala Santa 28, Trieste.
I1AQX	Albertini Emanuele, Strada di Guardiella 3, Trieste.
I1AVZ	Nadalutti Giovanni, Via Angelo Emo 6, Trieste.
I1AXE	Capon Guglielmo, Via Nicolo de Rin 2, Trieste.
I1AXF	Dapiran Fulvio, Via Vasari 12, Trieste.
I1AXG	Roccia Aldo, Via Capuano 4, Trieste.
I1AXH	Censky Antonio, Via Catullo 22, Trieste.
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I1BCR	Gombassi Giuseppe, Via Stoppani 3, Trieste.
I1BHI	Lucento dott Vincenzo, Via Tiger 12, Trieste.
I1BJD	Fontana Dario, Via Timeus 1, Trieste.
I1BMV	Giro Giorgio, Via Carlo Ghega 3, Trieste.
I1BNU	Cironcoli de Francesco, Via F Venezian 5, Trieste.
I1CFE	Fegec Eraldo, Via Edmondo de Amicis, Trieste.
I1CGT	Sponza Pietro, Via Lamarmora 4, Trieste.
I1SBD	Succi Pietro, Via D Rosetti 28, Trieste.
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I1YAK	Karis Miroslave, S. M. Madd. inf 748, Trieste.
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I1YAP	Taffra Camillo, Via Maiolica 1, Trieste.
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I1YBM	Zirnstein Walter, Via Tiepolo 4, Trieste.
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I1YBT	Bucci Stelio, Via d'Alviano 80, Trieste.

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DOROTHY AND DASHIELL

Did you know a President of the United States was responsible for the names given to the two Morse characters? According to the story, Millard Fillmore, 13th U. S. President, gave Samuel F. B. Morse his earliest support. Morse, in gratitude, named the two Morse code characters after Millard Fillmore's children—Dot for Dorothy; Dash for Dashiell.

MARS BULLETIN

MARCH 1951
Vol. 2 No. 2

Military Amateur Radio System

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PENTAGON BUILDING, WASHINGTON, D. C.

Mars-*Army Unit Supply Procedure*

From time to time items of Signal Corps equipment have been turned over to Mars accounts. This material is made available for issue to Mars-Army activities. Minor items—capacitors, resistors, wire, et cetera—are promptly divided and distributed among the Army areas on the basis of Mars membership and participation. Major items, such as transmitters and receivers, are held in depot stock for issue at the direction of the Chief, Mars-Army.

The availability of major items of Mars-Army equipment is shown periodically in Mars supply letters which originate in the Office of the Chief Signal Officer and are addressed to the Signal Officers of the Army areas. Such items are not available to individuals. These items may be requested by military units (ORC, NG, ROTC and RA) whose TO/E equipment is not suitable for participation in Mars activities.

Mars-Army equipment stocks fall into two categories. In one, "account 96–0," are listed those items that are in good, serviceable condition. Some are brand-new, complete with spares. Currently available in this group are a few Collins 25-watt transmitters; several each of BC–233 15-watt transmitters, BC–653 100-watt transmitters, and BC–654 transmitter-receivers; and one NC–100 receiver.

In the second stock category, "account 96–7" are listed items that are described as "unserviceable, but repairable." This categorical label is not always so grim as it sounds, since very frequently the item is "unserviceable" for a quite minor reason and may easily be restored for military-amateur service. The list of "96-7" items includes such things as one 350-watt WECo transmitter; one 400-watt 10-channel transmitter; a few BC–610's; several BC–187, 715-watt transmitters and Tech Radio Company 50-watt T–50–M transmitters. Also in the "96–7" class are a few Scott SLR–F and several SX–24 communications receivers. There are a few BC–221 frequency meters, too.

When Mars equipment is issued to a unit, it is on an "as is" basis. There are no funds for providing maintenance items or running spares. Repair parts and operating accessories must be obtained by the using unit.

Qualified units desiring to obtain Mars-Army equipment should submit a request in writing to the Commanding General of the Army area concerned, marked for the attention of the Army Signal Officer. If approved by the Army area, the requisition will be forwarded to the Office of the Chief Signal Officer for action.

MARS BULLETIN

MARCH 1951

VOLUME II NUMBER 2

ABOUT THE COVER: Lieutenant General Matthew B. Ridgway, new commander of the U. S. Eighth Army in Korea, inspected the MARS Headquarters Station in Washington before leaving for his new assignment. Here, Major General S. B. Akin, Chief Signal Officer, explains the WAR/K4USA control room to General Ridgway. Brigadier General Victor A. Conrad, Chief of Army Communications Service Division, looks on.

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The Military Amateur Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control. The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate chief; either to Chief, MARS-Army, room 2B313, the Pentagon, Washington 25, D. C., or Chief, MARS-Air Force, room 5B462, the Pentagon, Washington 25, D. C.

EDITORIAL

Nearly every blueprint for civil defense planning that crosses the desks of the MARS chiefs contains a reference to the use of radio amateurs for emergency communications. Yet nowhere is it spelled out *how* the amateur is to be used.

The chiefs, MARS, believe the time has come to resolve this question. It's high time to inventory our equipment, assess our system, find out how it might be used, on what frequencies it can operate, and make the necessary plans to provide maintenance, running spares, and the like when the going gets tough. The time for talk is largely over. If, as amateurs, we are going to be used, then let's say so, and begin to figure out how we can put every effort to work for maximum good.

A big step in this direction has been the expansion of MARS-Army to permit civilian amateur participation. There is a saying that you can't get sugar and furniture from the same maple tree. A group of military amateurs, likewise, cannot be mobilized for the Armed Forces and be used in civil emergencies at the same time. The new MARS expansion makes possible the use of common training nets, integrated military and civilian amateur operations. In the event of all-out mobilization there still would be trained and qualified operators, working in established nets and using Joint Army, Navy, Air Force procedures.

The Honorable W. Stuart Symington, Chairman of the National Security Resources Board, has described the NSRB Report on United States Civil Defense as a "grass roots" concept. He told a group of U. S. mayors in Washington, D. C., recently, that "Civil Defense can never reach down from the top."

So, with a grass-roots system in mind, let's fit the MARS into the civil defense picture.

The Federal Civil Defense Organization plans to operate and maintain a nationwide communications system. The best guess at this time is that this system will be electrical, probably wire, with a radio back-up. As it is to be an administrative and command network the federal and state governments probably will select the sites, install and operate equipment to provide direct and instantaneous communications service between national, regional, state, and local headquarters. It is not likely that any amateurs will be asked to assist in operation of any of the government stations. But the big contribution of radio amateurs will be in providing the tie-in between the local civil defense director and his various units. There is bound to be a welter of confusion attendant to any major disaster. Signal communications—many local networks operating on an integrated basis—will need a local control center and many feeder lines. The local system will not be complete unless it provides for local delivery of

messages and is readily accessible to agencies and persons the system is designed to serve.

MARS members, then, should concentrate on building *local* network facilities that can be used by local commanders (or civil defense directors) for what the military terms tactical-type operations. This follows the military concept of signal communications as a command function. Signal communications are the means by which a commander receives information upon which to base his decisions, by which he transmits commands and orders, and by which he directs the various activities which are his responsibility.

There should be one agency at the local headquarters (whether military or civil defense) charged with receipt, transmission, and delivery of messages. We call this agency a Message Center.

The purpose of a Message Center is to speed the transmission of messages. It seeks to accomplish this purpose by—

a. Providing a designated point to which messages and messengers may be directed.

b. Keeping informed of the current effectiveness of each available means of signal communication.

c. Properly distributing message traffic to the available effective means of signal communication.

d. Eliminating unnecessary delays in transmission.

e. Operating an efficient messenger service.

It is reasonable to assume that the primary interest of MARS members is in radio communication. Yet this is only one of the means of signal communication, and in order to be of real service to a civil defense director, the radioman is going to have to "join the team" and begin to consider all forms of signal communication as they apply to his local need. Employment of the *right* means of signal communication is the responsibility of the communications chief at each message center. If telegraph or teleprinter facilities are available, they normally will be used in preference to the telephone in order to keep the latter open for direct communication by the director and his staff. Maps, documents, photographs, and similar messages must, of course, be sent by messenger unless equipment for facsimile transmission is available. Radio (and MARS is a part of the over-all radio means) is of primary value as a *back-up* system to replace other systems, especially wire systems, which may become inoperable for any reason or are overloaded.

Radio communication has one distinct advantage over other types of signal communication, and that is the relatively high degree of mobility of the system. It is most likely that the civil defense director will want an emergency radio system that is mobile and flexible—mobile for maneuverability; flexible to insure integration with wire systems and independence from commercial power sources.

The use of radio is subject to the following limitations:

a. Range of communication is affected by the nature of the terrain.

b. Susceptibility to interference from atmospherics, and from jamming (either from enemy communication or from friendly stations).

c. Disclosure of physical location of fixed stations through use of position-finding equipment may be of value to an enemy nation or to saboteurs.

d. Relatively low traffic handling capacity.

Most of these limitations can be overcome, in large measure, by improving the individual radio operator technique with regard to operating procedure, signal intelligence, and signal security. MARS drill nets can increase the traffic handling capacity of a radio net. JANAP procedures should be employed on MARS nets at all times.

Frequencies for emergency work in civil defense may prove hard to obtain. However, MARS now has nets operating in the vicinity of the 160, 80, 40, 20, 15, and 10 meter bands on assigned military frequencies.

Actual network planning must await a decision of what circuits are needed. Ordinarily, one long haul circuit will be enough from a local community. Here again, other means of signal communication are better adapted to traffic handling than radio. Short haul circuits will need to be more numerous. Police, fire, transportation, plant protection, evacuation, and medical services may each need a separate channel, plus a liaison channel for interservice work.

The over-all system must be kept in mind, although planning may be achieved at the local level. All plans should be coordinated with the Army area MARS Director and with the State Director of Civil Defense. This coordination is necessary for planning both military and civil use of equipment and manpower. It is also necessary to insure that maximum benefits are derived from allocations of frequencies and equipment.

One other thing that every MARS member can do right now—make plans on a local basis to get stations on the air fast in the event of an emergency. One example—the City of Pittsburgh, Pennsylvania, during the recent Thanksgiving weekend snowstorm, furnished police headquarters with a list of ARRL Emergency Corps members and addresses. Policemen, on their regular appointed rounds, knocked on doors and asked amateurs to report on the air.

This should give you a start on local planning. Think your local problem through first, then get together with your State and Army area MARS Directors. They are experienced and capable in communications planning; they'll be able to help you if you'll only give them the opportunity.

THE VACUUM TUBE

(PART II OF A SERIES)

In part I of this series we saw how the plate current may be increased by regulating the current through the cathode so as to raise the temperature of the cathode.

There is a limit, however, to the increase in plate current that can be obtained this way. When the plate potential is reached, additional filament temperature releases additional electrons, but the effect of these electrons is lost so far as plate current is concerned. The plate is unable to accommodate more than the number which represents potential.

In fact, electrons themselves, when emitted in excess of potential, tend to exert a repelling force as they fall back on electrons within the cathode. This is known as the "space charge effect."

Once the proper filament voltage has been applied, the filament current is never varied. Variation of the plate supply voltage *up to the point specified by the manufacturer* is the sole means of change in plate current.

This is important to remember, because operating tubes in excess of their designed plate and filament voltage ratings results in efficiency losses and may shorten the operating life of the tube itself. It has been estimated that a 10 percent overload on a tube will decrease the tube life by as much as 50 percent.

RECTIFICATION

In the diode tube the cathode or filament is heated and emits electrons which flow to the plate when the plate is at a positive potential

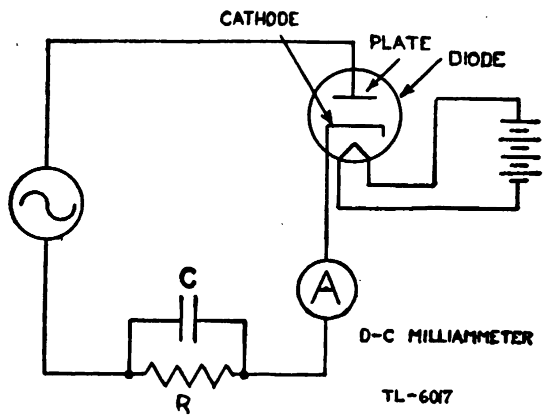

FIGURE 1. DIODE USED AS A HALF-WAVE RECTIFIER.

with respect to the cathode. The tube is a conductor in one direction only. Thus, if a source of alternating voltage is connected between the cathode and plate, electrons will flow only on the positive half-cycles of alternating voltage. When the plate is negative, there will be no electron flow.

It is this characteristic which permits use of the tube as a rectifier—that is, it changes alternating current to pulsating direct current. The alternating current may be anything from ordinary house-tap 60-cycle kind to the highest radio frequencies.

A single plate tube then becomes a half-wave rectifier since it utilizes only the half-cycle when the plate is positive. Full-wave rectification is accomplished by use of a two-plate tube. The plates alternate in current passing through them, thus making use of both halves of the cycle.

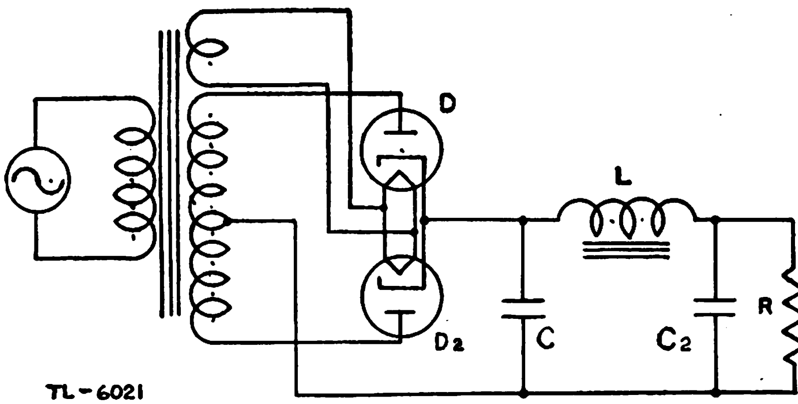

FIGURE 2. FULL-WAVE RECTIFIER CIRCUIT.

THE GRID

A grid consists of very fine wires laterally arranged and spaced so that a large portion of the electrons can pass through them. By moving a voltage dividing resistance either way from center it is possible to place either a positive or a negative potential on the plate. When in the center position this potentiometer produces no effect on the plate current, because there is no *EMF* on the grid. Since the grid is nearer to the filament than the plate, a positive potential placed on the grid will have much greater effect on the electric flow than an equal charge on the plate. The nearness of a positive grid to a filament will act as a prime mover to start or induce the flow of a greater amount of electrons toward the plate.

When the grid becomes positive with respect to the filament, electrons are attached to it and a current flows to the grid. When this current flows, power is dissipated in the grid circuit.

Now, if we move the grid toward the negative side of the resistance, the grid is made negative and the "space charge" begins to repel

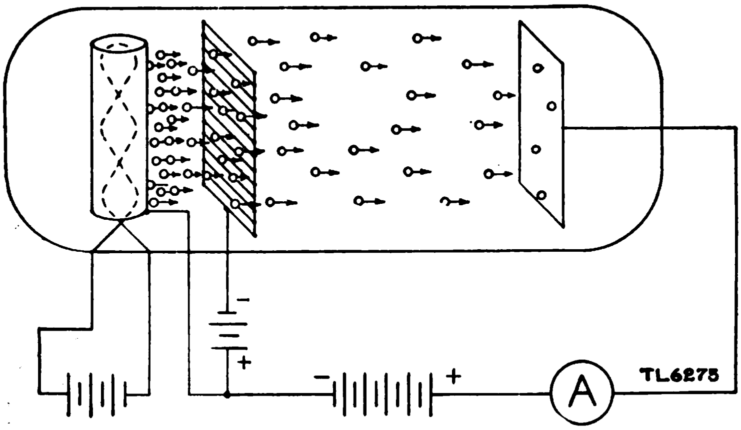

FIGURE 3. EFFECT OF NEGATIVE GRID ON PLATE-CURRENT FLOW.

electrons which would normally reach the plate, thus cutting the plate current flow below its usual value (fig. 3).

So long as the grid has a negative potential with respect to the cathode, electrons emitted by the cathode are repelled and no current flows to the grid.

A zero potential grid neither attracts nor repels electrons.

GRID POTENTIAL AND PLATE CURRENT RELATIONSHIPS

The value of the charge placed upon the grid is amplified in its relationship to the plate current so that even feeble signal impulses will produce relatively large plate-current variations. The flow of plate control is thus controlled by the valve action of the grid. The grid has a greater effect on plate current flow than the plate voltage.

If a resistance is placed in series in the plate circuit, the voltage drop across it can be changed by varying the grid voltage as well as by changing the plate voltage. A small change in grid voltage is amplified in the plate circuit and will cause a large change in voltage drop across the resistance, or load. Tubes are rated according to their amplification factor which is the ratio of plate voltage change required for a given change in plate current to the grid voltage change necessary to produce the identical change in plate current. The measure of amplification factor is the "MU."

Variation in plate current is directly proportional to the variation in grid voltage. The plate current can be set at any desired value by regulating the grid voltage of proper value.

VACUUM TUBE CIRCUITS

It is important to remember that any pair of elements in a tube forms a miniature condenser. The capacity from grid to plate we

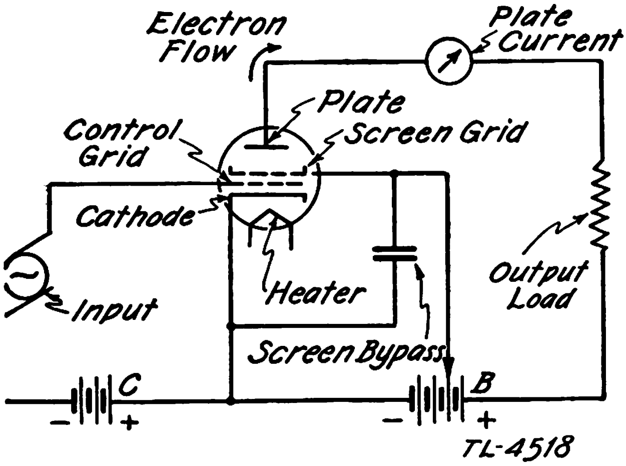

Figure 4. Tetrode Amplifier Circuit.

have just discussed. In triodes, the other capacities are the grid-cathode and plate-cathode. Multielement tubes contain similar capacities between the elements named and other electrodes.

The term "input" in a screen-grid tube refers to the capacity measured from grid to all other elements connected together. "Output" is a term which refers to the capacity from plate to all other elements connected together.

The same terms are used with triodes.

TETRODES

If we put a second grid into a tube to act as an electrostatic shield between the control grid and plate, the grid plate capacity is reduced to a negligible value.

This extra grid, called the screen grid makes a tetrode (four electrode tube) of the tube. Its principal features are to increase the amplification factor and plate resistance of the tube to values much higher than are possible in triodes.

Screen grids ordinarily operate at a lower positive potential than the plate.

SECONDARY MISSIONS

Secondary emission is the result of an electron, traveling at a high velocity, coming into contact with the plate with such force that it splatters other electrons from the plate into the interelectrode space. This action is speeded up by the second grid which accelerates the flow of electrons from cathode to plate.

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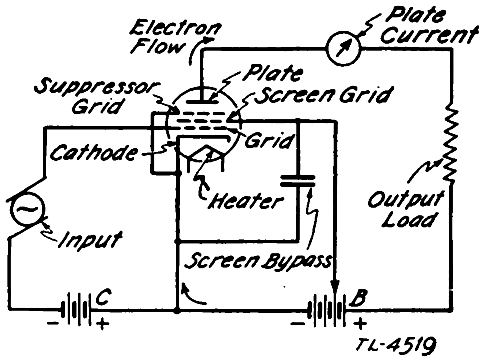


FIGURE 5. PENTODE AMPLIFIER CIRCUIT.

Whereas in the triode secondary electrons are repelled back into the plate due to a negatively charged grid (with respect to the cathode) in the tetrode there is a positively charged screen grid which attracts the secondary electrons, causing a reverse current to flow between screen and plate.

PENTODES

A third grid, called the suppressor grid, can be inserted between the screen and plate. This grid, connected directly to the cathode repels the low-velocity secondary electrons back to the plate without obstructing appreciably the regular plate-current flow. This means that larger, undistorted outputs are available from the pentode or five electrode tube.

(A discussion of vacuum tube circuits and pentodes will appear in the next issue of the MARS BULLETIN.)

AFCA AND THE MARS

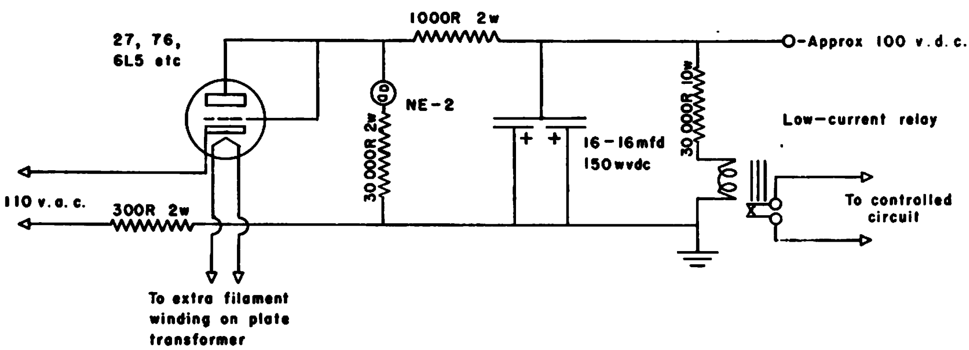
The Armed Forces Communications Agency has issued an invitation to all radio amateurs to attend AFCA meetings, and to become members of this industrial-military team working for national security, according to George P. Dixon of Washington, D. C., former I. T. & T. Vice President, now Executive Secretary of the AFCA, with an office at 1624 Eye Street NW., in Washington.

Radio amateurs traditionally are interested in civil defense—in lending a helping hand in time of local or national disaster, Mr. Dixon said. So is AFCA. Like the MARS, AFCA has a close community of interest with the military, although it is a private, nonprofit organization of American citizens interested in communications, electronics and photography. AFCA publishes a bimonthly magazine titled "Signals."

CUT AND TRY

BIAS SUPPLY SUGGESTIONS

Here is an idea for a simple bias supply similar to the one that I use in my rig. It is compact and foolproof. The circuit is of the "transformerless" variety, but the line-ground problem of such circuits is taken care of by the use of a line-protective resistor R–4. Should the equipment line plug be reversed in the a-c wall receptacle, this resistor will be placed directly across the line and offer sufficient resistance to avoid a short circuit. However, if this condition is allowed to continue resistor R–4 will burn open, as it is of low wattage rating.



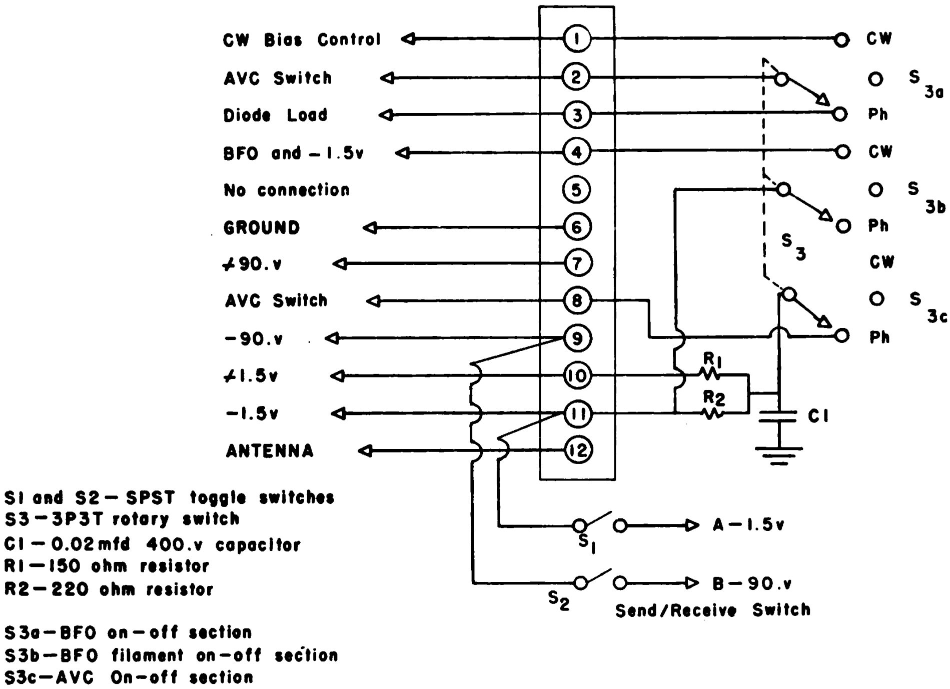
AC-DC BIAS SUPPLY.

An NE–2 neon lamp is employed to indicate normal operation of the bias supply. A reversed line connection or failure of bias voltage will extinguish the indicator.

A low-current relay with its coil connected in series with the bleeder resistor is employed to control the plate voltage of the bias tube(s). This relay acts as a time delay by preventing application of plate voltage before the filaments have heated and the bias has "come up;" and it also serves to remove plate voltage should the bias voltage fail.

Variable bias voltage may be obtained by using a potentiometer for a bleeder, or an arrangement of tapped resistors. I get 60 volts of bias for an 814 by loading down the bias supply with a 10,000-ohm resistor.

FRANCIS J. MCDONOUGH, A3PMV



BC–654 RECEIVER TERMINAL CONNECTIONS.

USING THE BC–654 RECEIVER BY ITSELF

For the benefit of MARS members who have acquired BC–654 transmitter-receiver combinations and who want to use the receiver as a separate unit for operation on MARS 4MC and 5MC frequencies, the following equipment modification is suggested:

Separate the receiver from the set by slipping it from the separable panel hinges and disconnecting the cabled wires from the terminal strip 2K1. Then, remove the battery access door from the receiver assembly by drilling out the hinge rivets, and remove the two sections of hinge from the lower edge of the receiver panel in the same manner.

When the receiver is thus separated from the transmitter it will be necessary to connect an external rotary switch to perform the functions that had previously been accomplished by switch IS1 in the transmitter section. The accompanying diagram shows how a 3-pole 3-position rotary switch can be connected to replace the IS1 sections. One section of this switch turns the BFO on and off; the second section kills the BFO tube filament for battery economy during phone operation; the third section serves to remove AVC voltage during CW operation.

In addition to the rotary switch there are two SPST toggle switches. One of these is used to control the filament voltage, while the other is used to remove plate voltage while transmitting as well as for battery economy during "warm up" periods. These switches may be mounted in whatever manner is most convenient to your needs.

It is recommended that this receiver be operated on batteries rather than a vibrator supply for the reasons that vibrator "hash" has been found to be bothersome, and 1.5 volts for the filament is difficult to obtain with such a unit. A standard No. 6 dry cell and "B" batteries seem to be best. However, a word of caution: The filaments of this receiver are "above ground," as well as the "B" negative. Do not use a common ground for "B" and the filament supply. You must use four separate wires from the battery pack to the receiver.

JIM CONNER, A3HCE

MORE ABOUT THE PE 103

In its original form, the low-voltage input of the PE–103 is connected for operation with vehicular electrical systems that have their positive sides grounded to the vehicle chassis. Those amateurs having cars with positive-ground systems can use their PE–103's "as is."

However, when a man with a car such as a Chevrolet tries to use a PE–103 for his mobile rig, he is likely to find himself embarrassed with a dead short across his car battery. The positive ground built into said dynamotor and the negative ground on his car's electrical system just won't work together.

The PE–103 owner faced with the need for modifying his dynamotor has the choice of two procedures—first, merely to alter the wiring of the machine; or, second, to revamp the whole thing into a new, lighter, and more compact unit.

At A3HCE we have chosen the latter plan, and have stripped from our PE–103 all of the components not essential for amateur mobile operation, added an idea of our own, and remounted it on a more compact base. In its new form the "ex–PE–103" is wired for negative-ground operation and contains, as a special feature, a relay Ry–3 that kills high voltage the instant that the dynamotor is deenergized and eliminates the "diminishing voltage" effect of the slowing machine.

Disassembling the dynamotor from its base is accomplished by—(a) disconnecting the high-voltage positive lead from the circuit breaker 3E3; (b) disconnecting the negative 12-volt lead from solenoid contactor 3E1; (c) disconnecting the negative 6-volt lead from contactor 3E2; (d) disconnecting the common lead (6v positive, 12v positive, 500v negative) from the positive terminal of the battery input cable at insulated post No. 1. After disconnecting these wires, remove the dynamotor from its base by releasing the four holding screws by which it is mounted.

In order to get at the dynamotor's internal connections the end-bell covers must be removed. With these covers off, examine the low-voltage end and identify the negative 12-volt brush. Remove the lead connected to this brush and discard it. Next, locate the positive 6-volt brush to which three wires are connected. One of these

three wires connects to the high-voltage negative brush; remove this wire from the dynamotor altogether. In its place connect a new lead to run directly from the negative high-voltage brush to the external circuit, passing it under the field coils and out through the body of the dynamotor.

After these changes have been made there should be four leads coming from the machine and they should be identified as positive 6-volt, negative 6-volt, positive 500-volt, and negative 500-volt. There will be no common connection or ground within the dynamotor itself. Replace the end-bell covers.

The base for the new assembly is a standard chassis-type unit with dimensions 12″ x 8″ x 3″. Prepare the chassis to receive the dynamotor by drilling suitable mounting holes, and by installing the filament relay Ry–1, the 6-volt starter contactor Ry–2 (salvaged from the old base), special relay Ry–3, control switches and indicator lights. From the schematic it will be noted that there is an electrical interlock between the filament switch S–1 and the plate switch S–2, which prevents starting the dynamotor before the filaments have been "turned on."

When the dynamotor has been mounted on its new base, wire up the unit as shown in the accompanying schematic diagram. The grounds should all be made to a common point, or a common bus, whichever is more convenient mechanically. The line fuse F–1 is not installed in the dynamotor base, but is mounted up as close to the car battery as is practical—on the fire wall, for example. This affords protection for the power cable as well as for the dynamotor itself.

A 4.0 mfd 600-volt filter capacitor is indicated in the h-v output of the dynamotor. This additional ripple filter may be required with some machines.

(*Editor's Note:* For remote control of the revamped unit, the switching circuits and the indicator-light circuits may be connected to a 5-contact receptacle for connection to a remote control box through a 5-wire control cable.)

Here are some data that may be of interest to PE–103 users:

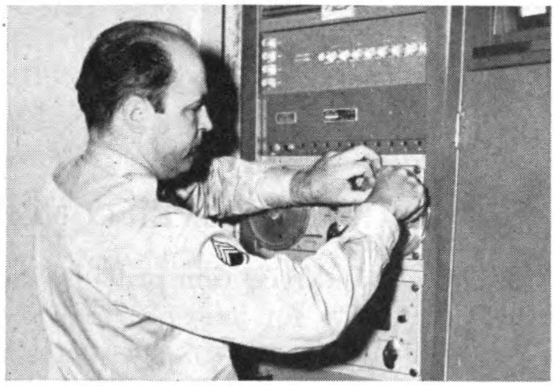
Input voltage	*Input current*	*Output voltage*	*Output current*
6 volts	16 amps	525 volts	100 ma
6 volts	21 amps	475 volts	150 ma
6 volts	26 amps	450 volts	200 ma
6 volts	31 amps	425 volts	250 ma

The above current and voltage data are approximate only and will vary with the condition of the battery, the charging rate of the generator, and with the automobile in motion.

JIM CONNER, A3HCE

MARS PERSONALITY—TRAVER OF THE WHITE HOUSE

First Lieutenant W. H. (for White House) Traver likes his job in the army. As a radio officer with the White House Signal Detachment, he is charged with planning and operating a radio system to provide signal communications for the President and his official family. The strain of keeping a jump ahead of White House communica-



WALLACE H. TRAVER, A4GMZ

tions requirements doesn't leave Wally a lot of time for MARS participation, but as A4GMZ he does get on the air when he can, operating from his trailer home south of Alexandria, Virginia.

Traver has been actively interested in radio since he was a seventh grade student in Glen Ridge, New Jersey. Several of the boys in school shared his interest, but young Wallace did not get an amateur ticket until 1934.

During the war, Traver was a B–24 pilot in the Air Force, operating from England most of the time.

After his discharge from service at the end of World War II, Wally worked for Western Electric Company and for Bell Telephone Laboratories in New Jersey. He also organized a consulting engineering firm on Aircraft and Police Radio systems. VHF radio has been his specialty since the war.

In October 1949, Traver rejoined the armed service as a sergeant with the Signal Corps. After nearly 1 year with MARS Headquarters station, WAR/K4USA, he was called to EAD as a first lieutenant and given his present assignment.

The job has its glamorous side—White House prestige; attending the Army-Navy football game as a duty assignment, etc.—but it calls for some pretty rugged duty at times also. The pressure is terrific; everything must be done "NOW." There are no second tries—a system must work properly the first time. And then, there are personal sacrifices—like last Christmas; while most MARS members were spending the Yuletide holidays with their families, Lieutenant Traver's wife and three children spent Christmas Day alone. The breadwinner was called off on another communications job for the President.

Traver is primarily a DX man. His other chief hobby is flying. He holds an instructor's rating in both single and multi-engine aircraft; has taught flying. When and if he expands from his present living quarters, he expects to resume another hobby—building TV sets.

NEW SINGLE SIDEBAND RECEIVER-CONVERTER

Studies show single sideband reception provides not only the highest known degree of reliability for ionospheric propagation, but the greatest practical frequency economy in the 1.5 to 30 mc band. To utilize these advantages, two models of a military SSB receiver-converter are under construction as applique units for military radio receivers for both tactical and fixed station use.

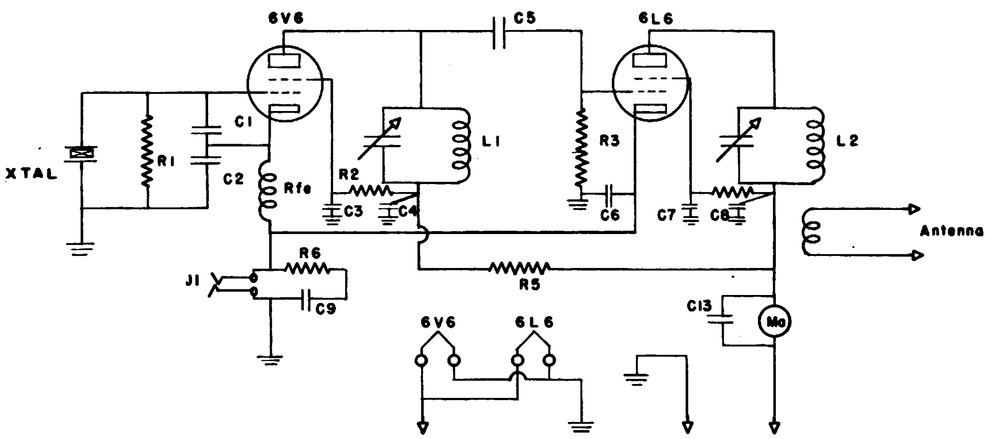
DIAMOND SAW BLADES FOR QUARTZ CUTTING

New diamond saw blades for quartz cutting, developed under Signal Corps contract with Norton Co., have been made thinner, thus reducing the width of the cut and effecting a saving in quartz. For an 8-inch diameter blade, the width of cut is reduced by one-third. Furthermore, the new blades will have a reduced diamond concentration of 25% and reduced diamond size, which produces extremely fine surfaces on the wafers, requiring less lapping to obtain good blanks. The wafers themselves can also be cut thinner, resulting in an additional saving in quartz. These two savings in quartz would become all the more important if the more costly synthetic quartz should come into use.

BEGINNER'S TRANSMITTER KIT

MARS, United States Army—Pacific, has been distributing some of its stock of "for cannibalization" items in the form of kits of related components. One of these kits has been made available to island-dwelling Martians complete with the parts necessary for assembling a nice little "beginner's model" transmitter. AB6FX, writing in the Seventh Issue of "MARS USARPAC" describes the simple rig that he constructed as the prototype for the "beginner's model" kit.

AB6FX says that it is easy to build, adjust and operate. It can be used as either a low-power transmitter or as the exciter for a higher power job. He built it in approximately 6 hours, and has used it successfully on both the Pacific Area Net and Oahu Net #1, as well as making some contacts with the West Coast.



Beginner's transmitter—drawn by Irwin S. Liner—AB6FX.

The oscillator is crystal controlled, using a 6V6 tetrode. It will be noted that the oscillator circuit employs a hook-up that resembles the Colpitts' in that the oscillator grid excitation is obtained from across a portion of a capacitive voltage divider. The crystal is connected in place of the usual inductor.

Output from the oscillator is developed across an L-C tank in the plate circuit of the 6V6, and is capacitively coupled to the grid of the 6L6 amplifier. The amplifier is a simple single-ended circuit with a series-fed plate. It should not require neutralization if the input and output wiring is dressed properly.

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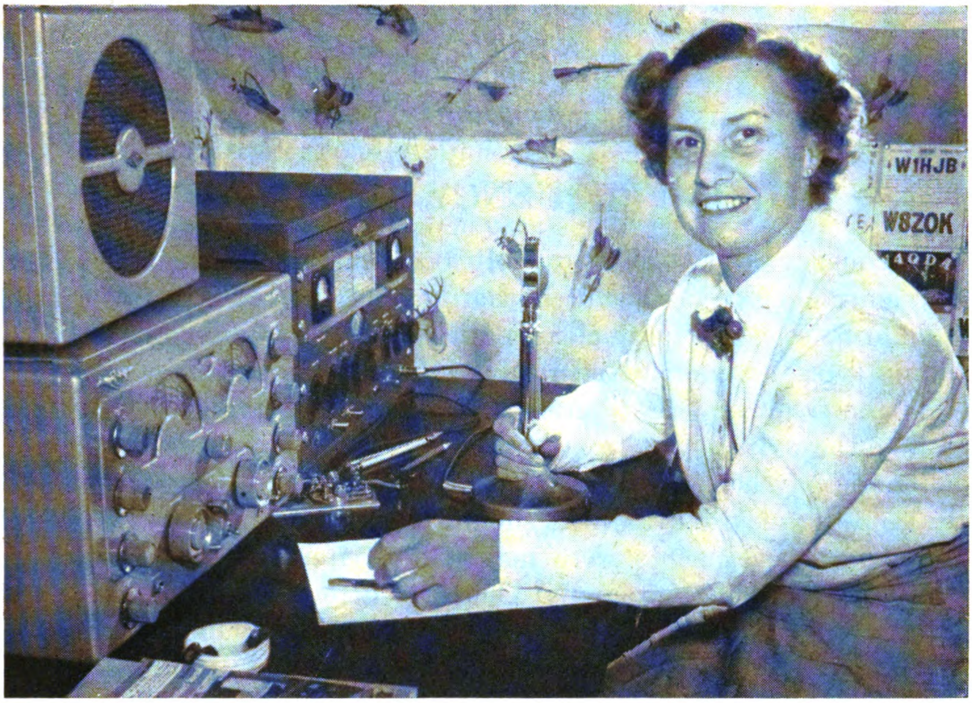
The cathodes of both the oscillator and the amplifier are keyed simultaneously. A series R-C filter is connected across the key to suppress key clicks.

AB6FX states that the capacitor and resistor values are not critical, and that even the capacitors in the oscillator circuit may vary a few percent before any sluggishness of oscillation is noticed.

The circuit will give best results when the 6L6 final works "straight through." However, says AB6FX, performance data for this transmitter on 7 mc (MARS 6997.5 kc) operation are colored by the fact that the local crystal situation required him to double from 80 meters. He measured 3 watts output from the final with a calculated 9-watt input, when doubling in the final. Higher output will be obtained when using the 6L6 as a straight-through amplifier, of course.

C1	Grid excitation capacitor	50. uuf ceramic
C2	Anode coupling capacitor	8. uuf ceramic
C3	Anode grid bypass capacitor	.001 uf mica
C4	Oscillator plate bypass	.01 uf mica
C5	Oscillator plate coupling	50. uuf mica
C6	Amplifier cathode bypass	.001 uf mica
C7	Amplifier screen bypass	
C8	Amplifier plate bypass	.01 uf mica
C9	Keying filter capacitor	0.5 uf mica
C10	Oscillator tuning	100. uuf variable, air
C11	Amplifier tuning	100. uuf air variable
C12	Power filter input	4 x 4 x 4 uf 350 WVDC
C13	Power filter output	
C14	Power filter output	
R1	Oscillator grid resistor	100,000.R, ½ watt
R2	Anode grid dropping resistor	50,000.R, 2 watts
R3	Amplifier grid resistor	50,000.R, 1 watt
R4	Amplifier screen dropping	20,000.R, 2 watts
R5	Oscillator plate dropping	5,000.R, 10 watts
R6	Keying filter resistor	150.R, ½ watt
Rfc	Oscillator cathode inductor	2.5 mh choke coil
J1	Keying jack	Open circuit jack
V1	Oscillator tube	6V6
V2	Amplifier tube	6L6
L1	3.5 mc inductor (33 turns #24, close-wound, 1″ diam.)	
L2	7.0 mc inductor (15 turns #22, close-wound, 1″ diam.)	
L3	Antenna link (6 turns #22 on bottom end of L2)	



ALICE SARGENT, A1SSO.

MARS YL STORIETTE

A "salty" YL is Miss Alice Sargent (A1SSO/W1SSO) who served 2½ years with the Coast Guard during the war and presently is a member of a Naval Reserve unit, signing the call, N1EFI.

"When I was discharged from the Coast Guard," Alice explains, "there didn't seem to be any active Coast Guard reserve unit near where I lived; the Naval Reserve said they would take me in and, bingo! I'm in the Naval Reserve until 1954."

Alice received her first amateur ticket in February 1950. "I became really interested in radio," she said, "when I realized I missed my radio work from the service. I missed the code and voice operations.

"After I was discharged I went to work for General Electric in Boston and one day I passed a store window showing short wave sets. One set was just like the receiver I used in the service and it made me so homesick that I went in and bought it—an NC-183.

"For a couple of years I just listened, and then one day I went down and took the amateur test. After I passed that I went out and bought my transmitter, a Collins 32 V-2."

Miss Sargent gives full credit to the Coast Guard for her radio operating ability. Her duty assignments included Cape Cod Canal, Salem Air Base (Air-Sea Rescue work).

keyed
to

MARS FREQUENCY ALLOCATION

Frequency allocations probably occasion more general dissatisfaction among MARS members than any other one item. Why this should be so is not quite clear, but it is true that most of the "complaint type" letters received at MARS Headquarters manage to suggest that the frequency distribution and allotted operating times are unfair to the writers.

There may be some injustices to certain individual stations. But to keep the record straight it should be pointed out that the present frequency assignments were made only after exhaustive study in the Office of the Chief Signal Officer to determine what division of frequencies and times would benefit the greatest number of operators over a long period of time. Geography, topography, and long-range propagation predictions are the principal guides in making frequency assignments.

Some stations have been reluctant to operate on MARS frequencies without being crystal controlled. Such reluctance is understandable. Working spot frequencies with an allowable deviation of point zero one percent makes crystal control desirable. No one likes to see the mailman coming when he's bringing a ticket for off-frequency operation.

Yet VFO need not be the dread bugaboo it so often is painted. Many of our best MARS operators are not rock bound. Certain basic precautions are necessary, however. It is presumed that each station has access to equipment for measuring its emitted carrier frequency or frequencies. FCC rules and regulations governing the Amateur Radio Service say that such measurement will be provided and stipulates—"The measurement of the emitted carrier frequency or frequencies shall be made by means independent of the means used to control the radio frequency or frequencies generated by the transmitting apparatus and shall be of sufficient accuracy to assure operation within the amateur frequency band used."

Since MARS members are licensed amateurs also, and since MARS frequencies are specially selected to be adjacent to the amateur bands, it would seem that the same method of frequency measurement used for amateur operation might also be applied to the MARS frequencies.

If, for some reason, no frequency standard is available, reasonably accurate operation may be obtained by using the net control station as a frequency standard. The following procedure is recommended in FM 24–18:

RECEIVER ADJUSTMENT

[illegible]n on receiver and allow it to warm up.

2. Tune receiver to approximate assigned frequency.

3. Tune in net control station (or other station to be used as standard) and zero beat to the received signal.

4. Do not change the frequency setting of the receiver after zero beat is obtained. The receiver will be used as a frequency reference for the transmitter. Hence it must be left at the setting of zero beat with the station used as standard.

TRANSMITTER ADJUSTMENT

1. Turn on transmitter and allow it to warm up.
2. Set tuning dial(s) on approximate assigned frequency.
3. Zero beat transmitter to receiver.
4. Lock transmitter tuning dial(s) at zero-beat setting.

The following procedure is recommended when the receiver has no beat oscillator (voice operation only).

1. Tune-in frequency standard (Net Control Station), adjusting receiver tuning until signal is received at maximum strength.
2. Reduce receiver gain control to low setting.
3. Adjust transmitter to approximate assigned frequency.
4. Turn on transmitter and allow it to warm up.
5. While speaking into the microphone in a low tone of voice rotate the transmitter tuning dial until voice is heard in receiver headset at maximum volume and clarity.

In zero beating a transmitter to another unit, care must be taken to keep the transmitter on the air for as short a time as possible in order not to interfere with other stations who may be using the frequency. A cardinal rule is always to listen before putting a carrier on the air. The use of "dummy" antennas for all transmitter tuning adjustments is recommended.

RADIO FREQUENCY CABLE

Test equipment is currently being developed at Signal Corps Engineering Laboratories to measure the transmission unbalance of twin coaxial and twin conductor radio frequency cable over the frequency range 1 to 25 mc and 100 to 160 mc. An experimental model has proved satisfactory.

MARS FREQUENCY ALLOCATIONS BY ARMY AREAS

The accompanying table lists the frequencies that have been assigned for MARS-Army use, arranged to show their availability to the Continental Army areas. The legend of the table is set up to indicate the permissible emissions, and time restrictions where such exist. All frequencies must be maintained within a 0.01 percent tolerance.

Included in this table is the 1.75–1.8 mc National Disaster Band. The nature of the MARS mission during disaster makes it necessary to include this frequency in planning.

The frequencies 3497.5, 6997.5 and 14,405 kilocycles are shared by both MARS-Army and MARS-Air Force. The master plan for this frequency-sharing has been set forth in the chart, "*Combined Army/Air Force* MARS *Frequency Allocations*," previously issued by the Chiefs, MARS.

The "2 mc" frequencies, 2220.0, 2258.0 and 2310.0 are not limited as to time and all Army area MARS Directors may schedule their use without restriction. The frequency 2360.0 kc is similarly without time restriction, but is available for use only in Fourth Army and Fifth Army Areas.

The "4 mc" frequencies are available for unrestricted-time use only in Sixth Army Area. Their use in other Army areas, as shown in the table, is unrestricted during daytime hours only. The use of these frequencies after local sunset is limited to the times indicated.

The "5 mc" frequencies are available as shown in the table, as are the 20,994.0 and 27,994.0 frequencies. . . .

F_{kc}	I	II	III	IV	V	VI	
1, 750. 0 1, 800. 0	X/a	U/a	X/a	U/a	U/a	U/a	National Disaster Band; *not exclusive to MARS*
2, 220. 0	U/b	U/b	U/b	U/b	U/b	U/b	
2, 258. 0	U/b	U/b	U/b	U/b	U/b	U/b	
2, 310. 0	U/b	U/b	U/b	U/b	U/b	U/b	
2, 360. 0	------	------	------	U/c	U/c	------	
3, 497. 5	S/c	S/c	S/c	S/c	S/c	S/c	
4, 020. 0	A/b	------	B/b	C/b	EF/b	U/b	Unrestricted daytime use
4, 025. 0	BG/b	AHb	------	DE/b	------	U/b	Unrestricted daytime use
4, 080. 0	A/b	------	B/b	C/b	F/b	U/b	Unrestricted daytime use
4, 085. 0	BG/b	AH/b	------	DE/b	------	U/b	Unrestricted daytime use
5, 500. 0	------	R/b	------	R/b	------	R/b	Thru daytime to midnight
5, 760. 0	R/b	------	R/b	------	R/b	------	Thru daytime to midnight
6, 997. 5	S/c	S/c	S/c	S/c	S/c	S/c	
4, 405. 0	S/a	S/a	S/a	S/a	S/a	S/a	
20, 994. 0	S/a	S/a	S/a	S/a	S/a	S/a	
27, 994. 0	S/a	S/a	S/a	S/a	S/a	S/a	

Legend: -/a 1.0 kw, A1 & A3 emission
-/b 0 1 kw, A1 & A3 emission
-/c 1.0 kw, A1 emission only
A/- 1800 to 2100 hours (local) Tuesday and Thursday
B/- 1800 to 2100 hours (local) Monday, Wednesday and Friday
C/- 1700 to 2000 hours (local) Tuesday and Thursday
D/- 1700 to 2000 hours (local) Monday, Wednesday and Friday
E/- 2000 to 2300 hours (local) Tuesday and Thursday
F/- 2000 to 2300 hours (local) Monday, Wednesday and Friday
G/- 2100 to 2400 hours (local) Tuesday and Thursday
H/- 2100 to 2400 hours (local) Monday, Wednesday and Friday
R/- Daylight hours only
S/- Frequency shared with Air Force
U/- Unrestricted time use
X/- Use restricted in some specified locations in Connecticut, Massachusetts, New York, New Jersey, and Florida; otherwise unrestricted.

Frequency 5,760.0 restricted to daytime use in the following areas: 100 mile radius of Patchogue, Long Island, N. Y.; 100 mile radius of Ft. Lauderdale, Fla.; 25 mile radius of Boston, Mass.

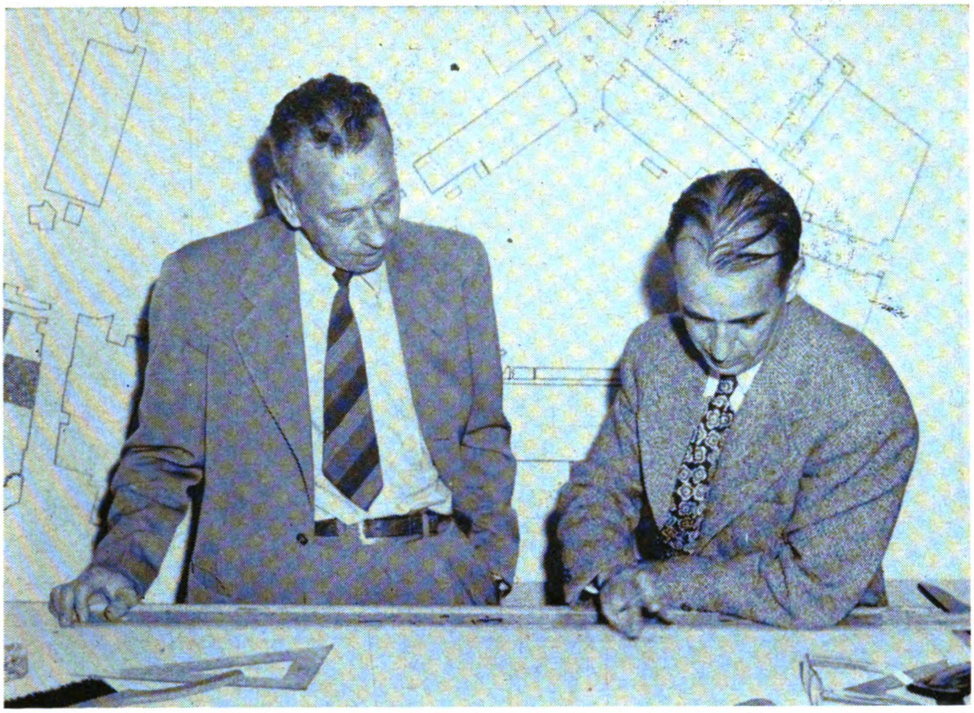
"Daytime" means the period beginning 1 hour after sunrise and ending 1 hour before sunset.

THE BUILDING OF A STATION

Major Generals F. L. Ankenbrandt, USAF, and S. B. Akin, Army, accompany Secretary of the Army Frank Pace, Jr., and Secretary of the Air Force Thomas K. Finletter through the MARS Headquarters Station. Corporal Mary Lafler operates.

October 26, 1950, was a red-letter day in the history of the Military Amateur Radio System. On that day a distinguished group gathered on the concourse of the Pentagon Building at Washington, D. C., to formally dedicate the new MARS headquarters station K4USA/WAR and K4AF/AIR. Present for the occasion were top military brass, leading radio manufacturers, representatives of Washington officialdom, numerous local area radio amateurs, and several hundred interested and/or curious spectators.

The story of this ceremony at which Secretary of the Army Frank Pace, Jr., and Secretary of the Air Force Thomas K. Finletter received the stations' dedications from Chief Signal Officer Major General S. B. Akin and Air Force Director of Communications Major General Francis L. Ankenbrandt, has been told through the public press, radio, and television broadcasts. However, the events leading up to this grand opening and a brief description of the stations remain to be told in the BULLETIN.



Al Hart, A3AX, and Mr. Hoyt W. Randolph, architect, go over the plans for the new Pentagon Concourse Headquarters station.

In a sense, the growth of the MARS headquarters stations is a reflection of the growth of the Military Amateur Radio System itself. The system had a modest beginning at the start back in 1948, using available surplus gear and "temporary" quarters. (K4AF was first located on the top floor of a former furniture factory, before an empty office in the Pentagon was acquired. K4USA was installed at one end of a conference room belonging to the Army Communications Center.)

As MARS grew and headquarters station activity increased, the need for more formal facilities for these stations became apparent. Permanent-type installations were indicated. At the direction of the Chief Signal Officer, Army, and the Director of Communications, Air Force, Captain Edward L. Nielsen, Chief of MARS-Army, and Major Raleigh H. Ralls, Chief of MARS-Air Force, undertook the planning for the new stations, assisted by Mr. Alton R. Hart (W3AX) Signal Corps electronics engineer.

Ideas were studied; some were incorporated into the plan and others were dropped. Little by little the over-all scheme took form. It was decided that K4USA and K4AF would have identical equipments and installations.

It was planned that an installation—K4USA/WAR, for example—would consist essentially of two operating positions and a master control desk from which the chief radio operator could exercise supervisory control of the individual operating positions and run the main

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Major General Scott, Chief of Signals, British Army, has a preview of the headquarters station. Left to right—General Scott, Colonel Cole, British Army; Brigadier General Conrad, Army Communications Service Division; Captain (now Major) E. L. Nielsen, Chief of Military Amateur Radio System—Army.

transmitter. The master control and the operating positions were to be placed in three separate, soundproofed rooms with glass wall panels and an intercommunication system that would enable the chief operator to observe and talk with the watch operators.

Mr. Hart's engineering plan was decided upon and approved; there followed the "where shall it be put" phase. Three general factors were involved in the matter of locating the new stations. First, the matter of space availability. At the Pentagon, despite the building's great size, space of any kind is at a premium. Second, there was the matter of noise level at the receiving positions. The vast amount of electrical equipment in the building, plus passenger busses and other motor traffic running through it, create considerable electrical noise. Third, it was desirable that the stations be placed where they could be readily accessible to visiting MARS men, fellow radio amateurs, and the general public.

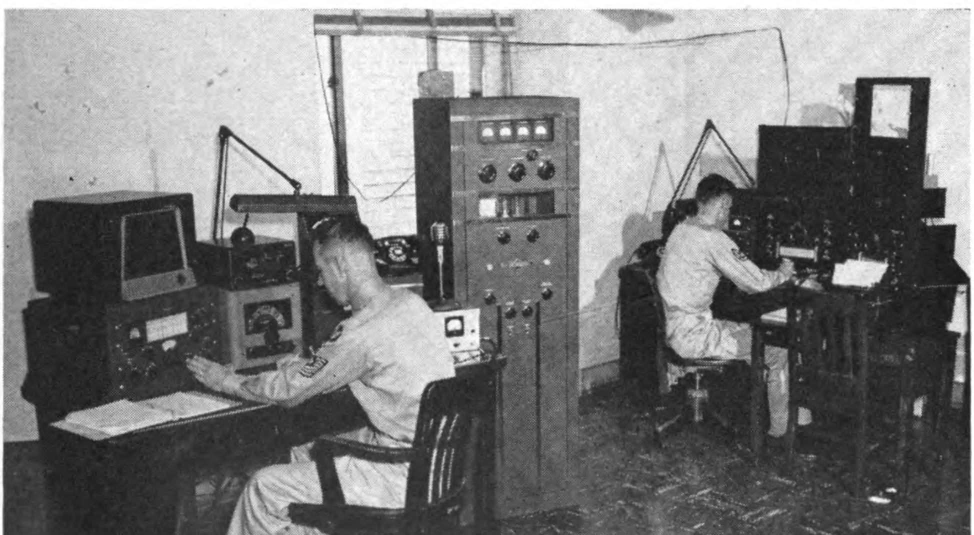
After a detailed study, it was decided to create new space by building a special "shack" on the concourse to house both the MARS-Army station and the MARS-Air Force station. The concourse, for the benefit of any who have not visited the Pentagon, is a huge area inside the building that extends north and south along the southeast side of the five-sided building, approximately at first floor level. On the con-

course are located such services as a drug store, a department store branch, a book shop, gift shop, barber shop, bake shop, post office branch, and so forth. The public has free access to the concourse at all hours. Security restrictions are enforced on the rest of the building.

The site finally chosen for the **K4USA–K4AF** "shack" was at the south end of the concourse, a location that had the most tolerable noise level. It enclosed an area approximately 40 feet by 30 feet located between two rows of concourse pillars. The space problem thus was met by "made" space, and the accessibility problem was satisfied by having the stations in a spot that is both convenient to visitors and free from security restrictions.

Construction was authorized early in 1950, but Public Building Construction workers were not immediately available because of other high priority government building construction. Meanwhile headquarters staff got busy on the equipment end by putting up the Gordon 20–10 meter beam antennas for the two stations, and making the 300-foot runs of balanced coaxial line from the roof down to the concourse, five floors below.

Actual construction of the station enclosure was started in June. Carpenters and electricians moved into action—the former "framing in" the area to be enclosed, the latter laying multiple lengths of conduit through which the audio, keying, and control circuits later were run.



The Air Force Headquarters Station AIR/K4AF before the move to the new consolidated control center on the concourse of the Pentagon Building.

Hard on the heels of the builders' crews came members of the headquarters gang. The larger items of equipment, such as the master consoles, the Temco main transmitters and the equipment racks had to be moved in before the outer walls could be completed. Then MARS men busied themselves pulling through the conduit hundreds of feet of shielded-pair runs that were destined to connect the K4USA/WAR and K4AF/AIR master consoles with their respective transmitters, equipment racks, and operating positions. This installation work was supervised closely by Captain Nielsen, A4ODI, assisted by Mr. Cyril D. Remmlein, A4KBB, Signal Corps electronics engineer.

Gradually the new "shack" began to assume its planned form. The enclosure was divided into eight rooms, including a common reception room, flanked on each side by two operating booths. At the far end of the reception room a short passageway leads to the transmitter room, with the control room for K4USA/WAR on one side and the control room for K4AF on the opposite side.

By August the "shack" was nearly finished. The transmitters and equipment racks had been moved into place. The work of hooking up the equipments then began with K4USA's M/Sgt. Paul E. Allyn, A4EEP; Sgt. (now First Lieutenant) Wallace H. Traver, A4GMZ; Sgt. Frank Stoll, and K4AF's T/Sgt. Harry T. Simms, AF4HBD, doing the hard work. Some idea of the magnitude of their job may be had when it is realized that each of the station installations required

Army MARS Headquarters Station WAR/K4USA was located in an Army Communications conference room on the fifth floor of the Pentagon.

the identification and connection of 287 *pairs*, not counting antenna and power connections.

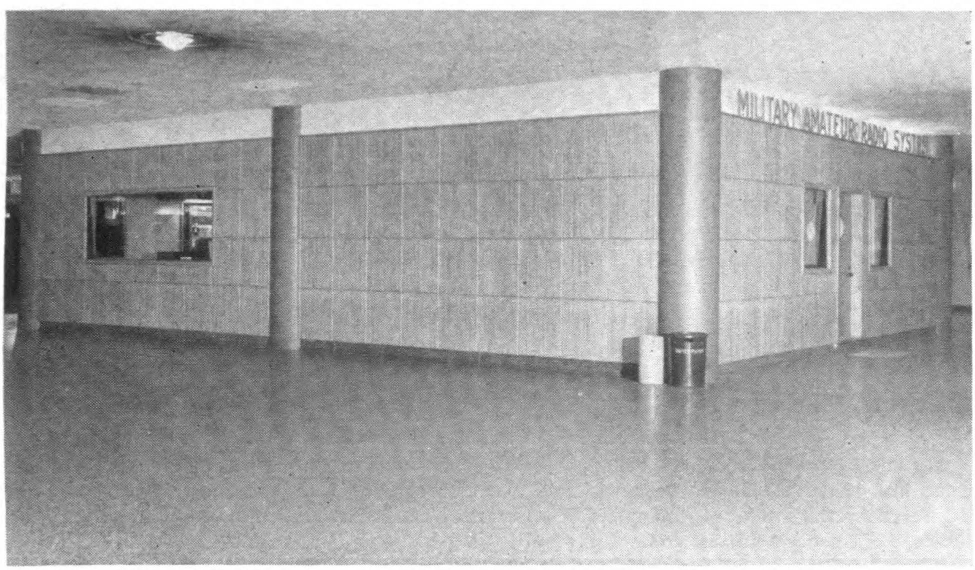
Mid-September found K4USA/WAR ready for its trial runs. Al Hart, W3AX, having designed the installation and supervised construction of the station equipment, ran the initial tests. Amateurs were contacted in the 20-, 15-, and 10-meter bands; the headquarters crew thrilled as "excellent" reports began pouring in.

The station's central attraction is its master control console. The K4USA and K4AF consoles were designed especially for MARS, and there probably isn't another just like them anywhere. The master console permits the control operator to exercise full supervision and control of the station.

The heart of the control system is mounted on two horizontal panels in the center of the console. Here the control operator faces an array of knobs, levers, and dials through which he works. Without leaving his seat he can turn the transmitter on and off, shift frequency throughout a chosen band, "ride gain" during voice transmissions, monitor both ends of a QSO, and communicate via intercom with operators in either booth. Should an interesting QSO warrant, he can "put it on tape," merely by pressing a recorder control button on the panel.

The upper panel carries the station operating and monitoring controls. The most conspicuous item is the automatic selector dial by means of which the Temco main transmitter is controlled. Using a single-digit code the control operator turns filaments on, selects either CW or voice emission, and applies plate voltage. A two-digit code is employed for selecting transmitting frequencies.

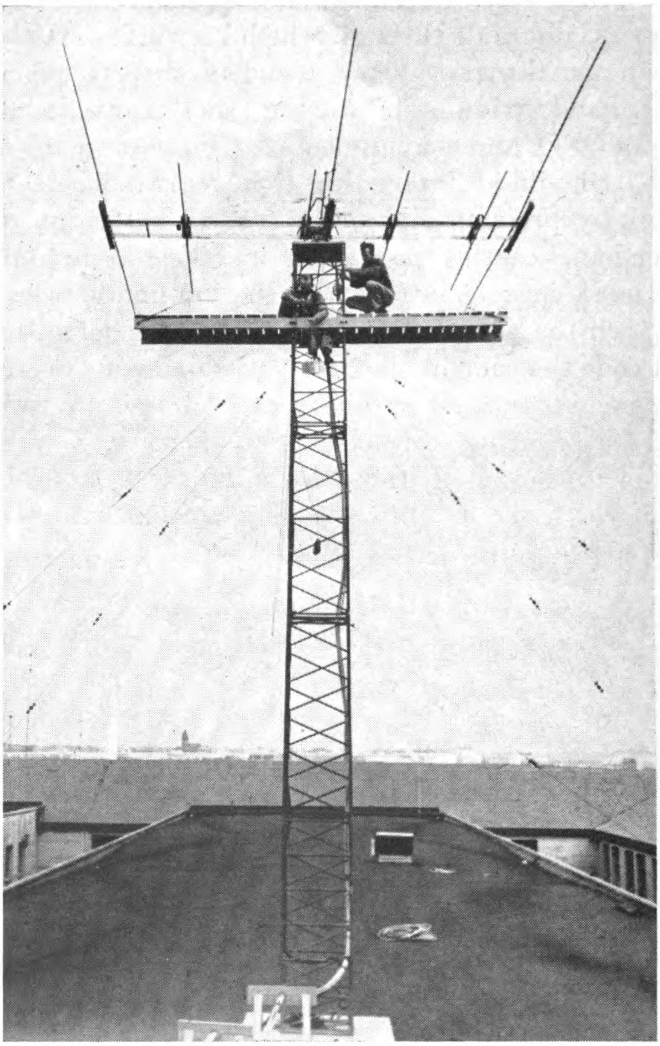
In addition to the automatic selector dial, this panel holds knobs by means of which the monitor speakers can be connected to any of the station's audio outputs, and other knobs for adjusting the moni-



The new location is right in the concourse.

tor amplifier levels. Lever switches are provided for assigning carrier control to the operating booths, for placing the limiter amplifier in and out of the circuit, and for beam rotation control.

The lower control panel is actually a broadcast-type consolette. On this panel the control operator has control of the duplicate microphone lines from each booth, as well as the two microphones that are for his own use. In addition to its use for speech input control, this same panel provides the facilities by means of which the control operator can listen in on either booth, and give supervisory instructions to the operator working there. This scheme is especially valuable when "visiting firemen," who are not familiar with the installations in the booths, check out the new equipment.



Mr. C. D. Remmlein and Pvt. Raymond McSherry install a matching network on the MARS antenna atop the Pentagon. Mounted on the same boom are the three-element 14 MC antenna and the four-element 28 MC antenna. Three hundred feet of balance coax line run to the Temco main transmitter five stories below.

On either side of the center section of the console are duplicate Collins 75A–1 receivers, each with its own panoramic adaptor. These receivers are used for monitoring, and when operating **K4USA/WAR** directly from the master console.

The left wing of the master console contains a Collins 32V–2 transmitter that serves as the vfo and exciter for the Temco kilowatt. Mounted in the right wing is a modified GE single sideband selector which may be used with either of the 75A–1 receivers.

The equipment racks and Temco transmitter are built into the wall behind the master console. The transmitter consists essentially of a conventional class "C" final using a pair of 833's, a class "B" modulator, also using 833's, an audio driver, power, and bias supplies. The special feature of the Big Rig, though, is the automatic tuning arrangement by means of which the control operator selects frequencies. The grid tank and plate tank of the final are tuned by individual motors, controlled through "Reeves Positioners" which, in turn, are controlled by the automatic selector switch in the master console.

The equipment racks flanking the Temco transmitter contain the receiving antenna patching panel, tape recorder, BC–221 frequency meter, control patching panels, an S–36 VHF receiver, a Hammar-

T/Sgt. Harry Simms sorts out the long "spaghetti" and tags it preparatory to wiring-in the AIR/K4AF equipment racks and master control console.

lund SP–600 general coverage, a patch panel for audio and control circuits, the standby Collins 32V–1 transmitter, and a Plex–10 limiter amplifier.

All of this gear is enclosed in a separate, acoustically treated room. A long "picture" window in the outside wall facing the master console gives concourse passersby a convenient view of the station equipment. Glass partitions in the inside walls give the control operator visual supervision of the operating booths to supplement his aural monitoring system.

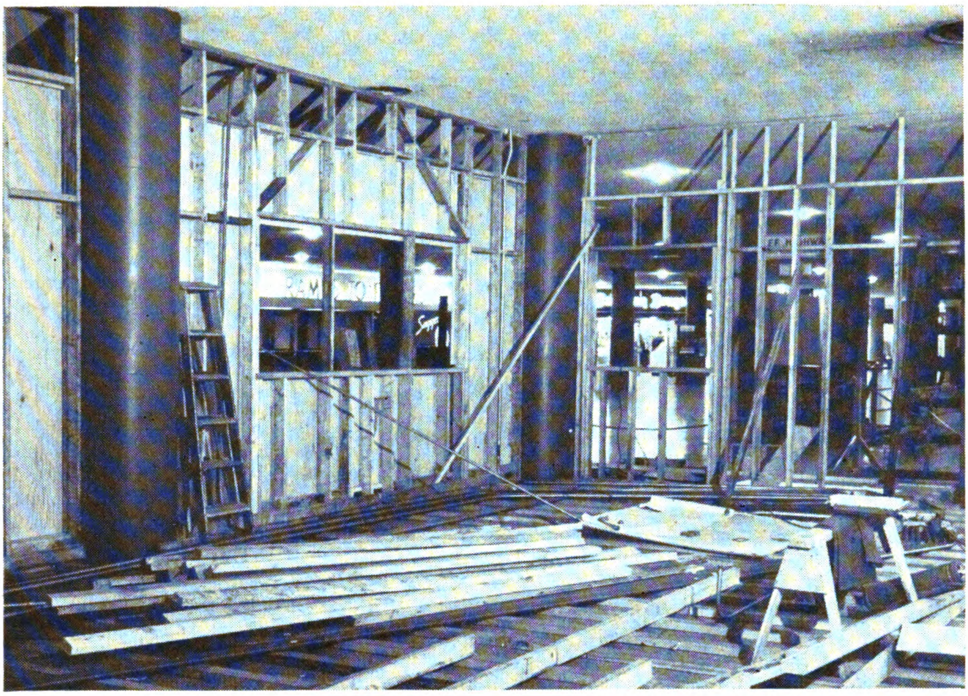
The two operating booths associated with the control room are soundproofed, and the operator QSOing in one of them is completely protected from any local sound distractions (except, of course, when "the Voice of Control" comes in over the intercom speaker).

For 2 weeks after the initial tests in mid-September Captain Nielsen, A4ODI, and Al Hart, W3AX, ran the station at all hours of the day and quite a few nights, "wringing out" the equipments and putting the installation through its paces. The few bugs that popped up were quickly squashed. The operating tests conducted during this period showed the station was "up to spec" and ready for its new career.

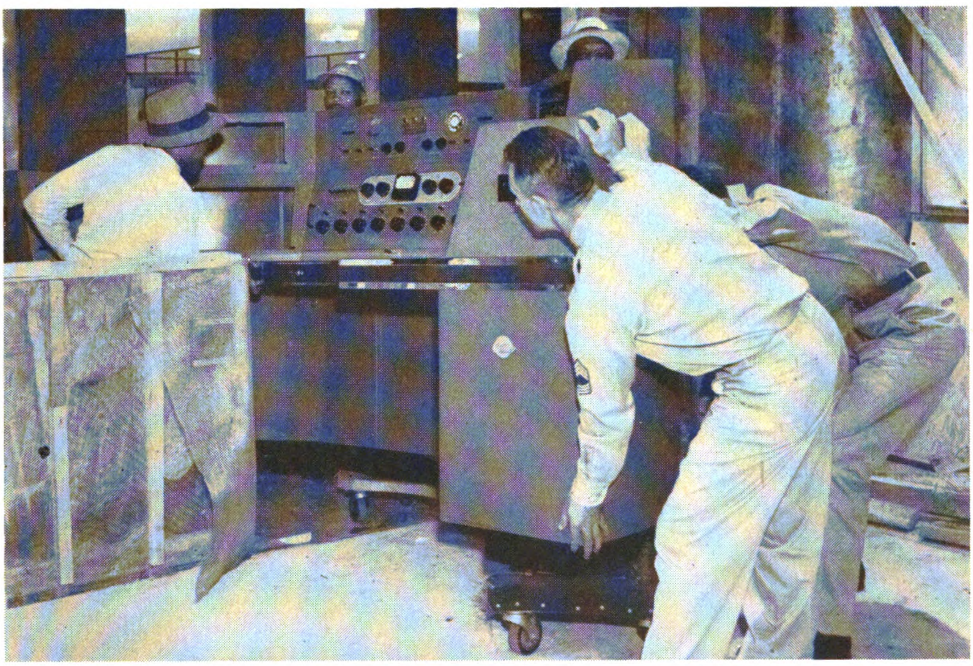
Early in October, as a final workout, the new K4USA/WAR was put into full-time operation, 24 hours daily. The headquarters operators were given the opportunity to familiarize themselves with the intricacies of the installation—especially the master control system, which is a "beaut." Station operation daily became more smooth. When the day of baptism came, the station and its crew were well broken in, ready to demonstrate their efficiency to the world.

INTER-SERVICE COORDINATION

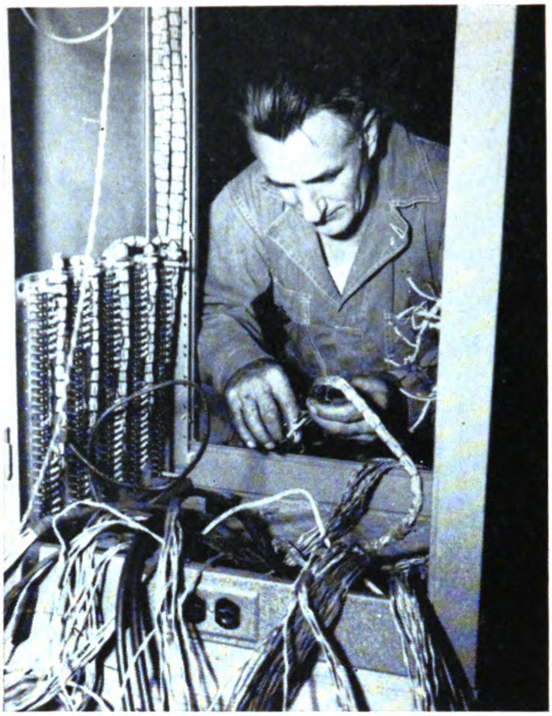
Television Link Equipment, type FTL–27A, has been furnished by the Army to the Navy Special Devices Center, Port Washington, L. I., on a loan basis. This equipment is to be used by the Department of the Navy to evaluate television as a means for mass training of personnel. Results of the study will be made available to the Department of the Army for information and possible use.



The initial framing, before copper-screen shielding was installed.



"Horsing in" the equipment. Note the copper shielding.



Connections to all control and audio circuits are available at the jack field mounted on a panel in this rack. These circuits include low-level (input), high-level (output), keying, and remote lines.

Major General S. B. Akin speaks at the station dedication.

Charles C. Mack, A2BRJ.

MEET CAPTAIN MACK

Captain Charles C. Mack has been named head of the Air Force portion of the Military Amateur Radio System replacing Major Raleigh H. Ralls who has been assigned with a classified Air Force project.

Charley is the handle employed by Captain Mack when he is on the air. His station call is AF2BRJ/W2BRJ, which soon will be modified to fit his new geographic location. Readers of QST will recognize W2BRJ as an ardent exponent of VHF work and high scorer in the 1950 Field Day activities. He snagged 137 contacts in 5 hours of operation. All contacts were made Aerial/Mobile from a C–47, using an ARC 3 transmitter and a battery powered, two-meter converter to a BC 348 receiver.

Captain Mack, a VHF enthusiast, plans to install a radioteleprint net linking Continental Air Command (CONAC), Mitchel Field, New York; Headquarters USAF, Washington, D. C.; and Eastern Defense Air Command, Newburgh, New York.

Captain Mack is a native of Maine. He was associated with Raytheon Manufacturing Company before enlisting as a cadet in the Air Force in 1941. He was commissioned a second lieutenant in August 1942; served as a fighter pilot during the war, including 2 years in Iceland.

BEAMED OUR WAY

Congress of the United States
House of Representatives
Washington, D. C.

To: Station K4USA/WAR

Gentlemen . . . . . I was busy when your message from my friend A. R. Van Compernolle in Santa Ana came in, and I did not get to write him a letter until today. I thought you might like to see the letter.

Cordially yours,

JOHN PHILLIPS, M. C.

Mr. A. R. Van Compernolle
Santa Ana Branch 737, N. A. L. C.
Santa Ana, California

My dear Mr. Van Compernolle:

I have always been intrigued by the way you amateur radio operators keep in touch with each other, and often get messages through under the most interesting circumstances.

I live next door to Ed Dunn in Banning and I know what a wide circle of amateur radio friends he has, and I know George Sterling of the Federal Communications Commission very well, who is an old amateur radio enthusiast, and I think Bill Smith of Los Angeles, who bought radio station KPAS, in Banning, from my younger son, is one of the original radio "hams."

So I was interested to get your message a few days ago, through K4USA/WAR. So far as the legislation was concerned, it has always been a pleasure to do anything I could for the letter carriers.

Sincerely yours, JOHN PHILLIPS, MC.

Received From The USS *Roanoke* As Part Of The Dedication Ceremony For The MARS Headquarters Station

FROM A CRUISER AT SEA IN THE ATLANTIC OCEAN CMA THE NAVY SALUTES MARS RADIO STATION WAR X YOUR NEW STATION WILL BE ANOTHER IMPORTANT LINK IN AMERICAS MILITARY AMATEUR RADIO SYSTEM X THE AMERICAN RADIO AMATEUR HAS A PROUD RECORD IN WAR AND PEACE X TWENTY FIVE YEARS AGO THE RADIO AMATEURS FORMED THE BACKBONE OF THE NAVAL COMMUNICATION RESERVE AND HAVE CONSISTENTLY CONTRIBUTED TO THE EXCELLENCE OF NAVY COMMUNICATION X THE CONCEPT OF THE NAVAL COMMUNICATION RESERVE IS. CONTINUED TODAY IN THE NAVAL RESERVE ELECTRONICS PROGRAM WHICH FROM ITS INCEPTION REALIZED EXTENSIVE PARTICIPATION OF THE RADIO AMATEURS X THEIR COUNCIL AND ASSISTANCE WAS MOST VALUABLE IN THE PLANNING AND IMPLEMENTATION OF THE ENTIRE PROGRAM FOR THE NAVAL RESERVE AMATEUR NETS WHICH PARALLELLED THE NAVAL RESERVE NETS X THE USS ROANOKE IS HAPPY TO ACT AS SPOKESMAN FOR THE NAVY IN EXTENDING OUR WELCOME AND BEST WISHES TO MARS RADIO STATION AS A MOST IMPORTANT LINK IN THE MILITARY AMATEUR SYSTEM

The Joint Chiefs of Staff
Washington 25, D. C.
23 October 1950

Dear General Akin and General Ankenbrandt:

My thanks to you both for your attractive invitation to be your guest at the opening of the new headquarters station of the Military Amateur Radio System at noon tomorrow. I have been following the construction of the station with considerable interest and congratulate you both on its completion.

One of the great sources of strength of our military establishment is our ability to provide opportunities for our servicemen to follow their natural inclination. The Military Amateur Radio System established jointly by the Army and Air Force has already won wide acclaim in this field and my best wishes are with you for continued success.

Nothing would please me more than to be able to join you for the presentation ceremonies. Unfortunately, however, the Military Committee of NATO is meeting at the same time on Tuesday and I am fully committed for the time the presentation ceremonies are to be held. While I cannot be there in person, my thoughts and felicitations will be with you.

Sincerely,

OMAR N. BRADLEY.

CANADIAN AMATEUR RADIO GREETING—Group Captain E. A. D. Hutton of Ottawa, Director of RCAF Telecommunications Operations and Chief Controller of the Air Force Amateur Radio System, transmits the annual yuletide greeting from Air Marshal W. A. Curtis, Chief of the Air Staff, to 1,000 members of the AFARS from station VE3BFX at Air Force Headquarters in Ottawa. Flying Officer C. L. McManus of North Bay, Ont., acts as assistant operator while Air Commodore W. A. Orr, Chief of RCAF Telecommunications of Daysland, Alta., and Ottawa, looks on. The AFARS, formed after the war, links together amateur radio operators across Canada and allows them to coordinate their efforts and provide communication facilities during emergencies. Many valuable public services have been performed by the AFARS members since the system's formation, notably, facilitating relief operations during the British Columbia floods of 1948 and the Winnipeg floods of 1950.

MARS CPX—SEPTEMBER, 1950

The MARS Command Post Exercise (CPX) conducted throughout MARS-Army on 2 September 1950 proved one point definitely. Participants either like 'em or they have no use whatsoever for the CPX contest conducted on spot frequencies.

Most of the members like the spirit of camaraderie that "rubbing elbows" on the same frequency gives. Some of the operators, working small rigs, low power, feel they are penalized by being forced to compete on the same basis as the super duper station. And they have a point. As A5MF (Robert Z. Glass of Bellair, Texas) puts it: "Twenty-two years experience and seven watts cannot compete with a trainload of BC–610's."

Working on spot frequencies points up the absolute necessity for network discipline.

Army and FCC monitors spent a busy day reporting infractions and violations of off-frequency operation. Even zero-beating with WAR and other net control stations was not too successful. Crystal control appears the only reliable method of insuring adherence to the rigid .01 percent tolerance allowable for MARS operation.

CPX RESULTS

FIRST ARMY

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Emerg Pwr	A2MON	W2EMS, EVF, JEW, VBP, WXC	453
Single Op, Emerg Pwr	A2ESM	A2ESM	144
Single Op, Com Pwr	A2LRW	A2LRW	96

OTHER Participants: A1RGB, RXY, SIZ; A2AHN, BX, DRM, EBZ, IAZ, TRN, YAU.

84th ABN SIG Co, Station A9WAH, on maneuvers at Camp McCoy, Wisconsin.

SECOND ARMY (WAR—122 Points—Multiple Operation)

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Com Pwr	A4WBG	A4EXO, LEI, PBX, PVR	66
Single Op, Com Pwr	A3HIX	A3HIX	64

OTHER Participants: A3EGN, LTC, NTC, OGL, QS, USA; A4FBJ, IYC, NGX, SR, VP.

THIRD ARMY

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Emerg Pwr	A4WAR	A4EEC, GZP, JHU, LDM, Eugene Carey	288
Single Op, Emerg Pwr	A4USA	Bernard DeCecco	106
Single Op, Emerg & Com Pwr	A4EDA	A4EDA	53
Single Op, Com Pwr	A4OVE	A4OVE	30

OTHER Participants: A4CYC, RMD, WBL, WBN; A5WAR (5PDM Opr).

FOURTH ARMY

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Emerg Pwr	A5FOM	A5NXQ, RIT	104
Single Op, Emerg Pwr	A5WAQ	A5QLG	132
Single Op, Com Pwr	A5WAC	A9GAE	77

OTHER Participants: A5AAD, EGX, GII, IPT, KQZ, MF, MKE, PZS, QEY, USA, WAB, ZU.

FIFTH ARMY

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Emerg Pwr	A9USA	A9CQU, FSN, JRV, KUB	326
Single Op, Emerg Pwr	AØLHT	AØLHT	124
Single Op, Com Pwr	AØIA	AØIA	48

OTHER Participants: A8SWG; A9DRU, FOG, NZH, PDS, TEK, WQA; AØASO, BQM, ETK, OZN, QHT, VKP.

SIXTH ARMY

	STATION	*OPERATOR(S)*	*SCORE*
Multiple Op, Com Pwr	A6ZZM	A6OQY, HVE	76
Single Op, Com Pwr	A6USA	A6AZ	78

OTHER Participants: A6WBB, A7FIX.

USARPAC

	STATION	*OPERATOR(S)*	*SCORE*
Single Op, Com Pwr	AB6USA	Alex Pappas	55

OTHER Participants: AB6AAQ, AAY, ACB, ADK, ADY, AEH, UV

A SWING 'ROUND THE CIRCUIT

In the light of our very serious national economic and military problems, the scope and direction of the Military Amateur Radio System—Army are coming in for careful reexamination and scrutiny by military leaders.

Many of the Army areas must rely heavily (in some cases, almost entirely) on MARS equipment and personnel to provide the back-up radio channels their organization charts call for.

The MARS System suffers a serious handicap in the lack of full-time administrative personnel and lack of a clear-cut delineation of what is to be expected of the military in the role of emergency and/or civil defense responsibilities.

All Army area command directors are emphasizing the need for flexibility and mobility. In all areas the MARS is an integral part of the Continental Army Communications planning. Communications reports from the field reveal the following:

FIRST ARMY

One sample of what the First Army is accomplishing is the Baker Phone net established in New England subarea. At periodic intervals

Warrant Officer Frank Haas fingers the bug and Sergeant James F. Bannan records messages on log. They are part of the A2MON team entered in multiple operation station class during the MARS-Army CPX, 2 September 1950.

the Baker net holds communication exercises to promote interest in message handling and to improve the operating efficiency of MARS phone men.

The problems are given realistic touches by inserting such situations as declaring stations "out of action" for certain periods, radio jamming, and transmission of unscheduled intelligence bulletins.

First Army Headquarters has been most active in furnishing MARS displays as part of Signal Corps exhibits throughout the Army area. Captain Francis Rosser is Command Director.

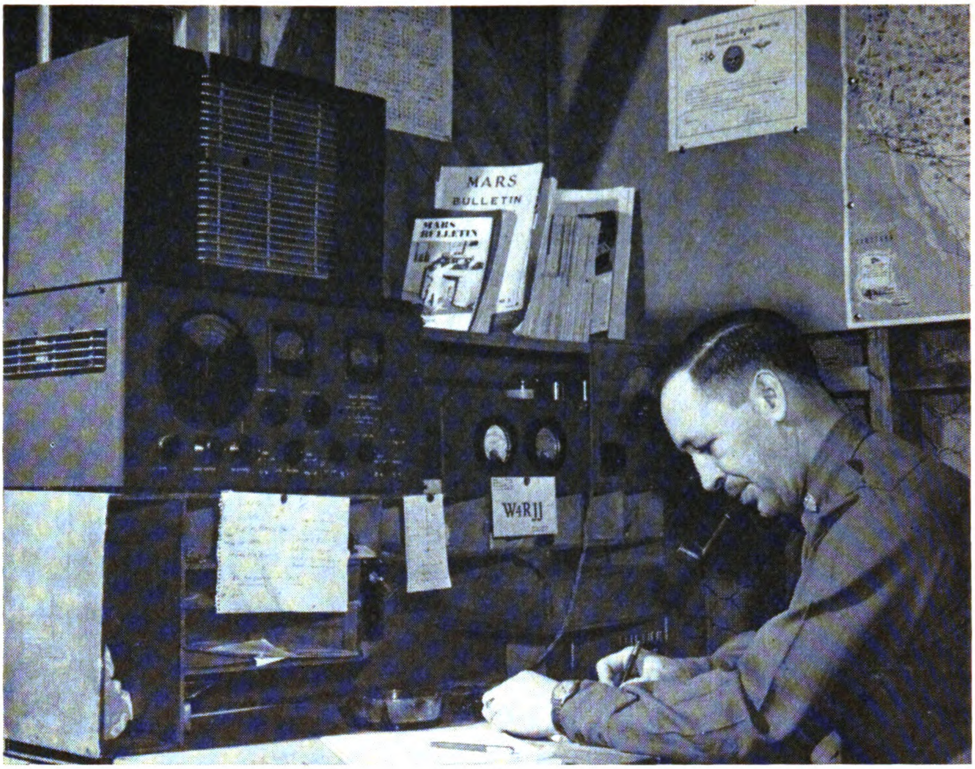
SECOND ARMY

Second Army MARS is currently planning a MARS teletypewriter net. Big problem right now, according to Lt. Lingle, Second Army MARS Director, is finding a suitable frequency. It is hoped to get something started on a low frequency; at the present time 20994 kc and 27994 kc are the only MARS frequencies cleared for 1.1Fl (Teletypewriter) emission.

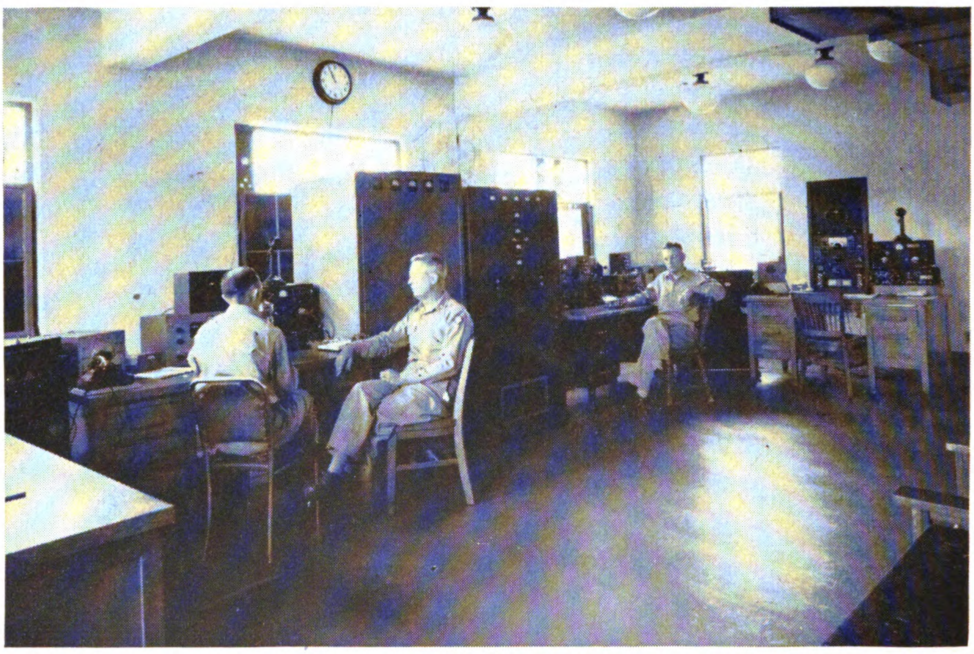
THIRD ARMY

Third Army Headquarters Station conducted some extensive tests on 4020 kc prior to Third Army organization of Army-wide phone nets. The network reorganization now is under way; so far no complaints have come in from neighboring Army areas—4020 kc is limited

W. B. Valentine, A4LDW, student at the University of Kentucky, operating Signal Corps R. O. T. C. equipment during an ARRL DX contest (Photo by W4SWL).



Captain Marion H. Boutelle does a bit of hamming from his personal station, A4RJJ, located at Fort McPherson, Ga.



Sergeant C. C. Cash, A5PML, and Colonel C. H. Hatch, A5QVE, Fourth Army Signal Officer, operate A5WAH. At the right is Lieutenant Colonel R. W. Jackson, A5FCP, Fort Sill, Okla., Post Signal Officer.

to 100 watts to the final amplifier and is on a "noninterference" basis: the frequency is shared with other armies.

To spur membership recruiting in the State of Tennessee, Command Director Major Lambeth, "scrounged" two Test Sets I–56–A, consisting of a combination tube tester and set analyzer, a volt-ohmmeter, a-c output meter, test prods, metal carrying case and miscellaneous adapters. These are surplus items, excess to military requirements.

One will be given to the MARS member, living in Tennessee, who brings in the largest number of new Tennessee MARS members. The other will be given the Third Army MARS member, not a resident of Tennessee, who recruits the most new members for that state.

Supply-wise Third Army MARS is also on the ball. Three kits are available to their membership as follows:

Kit #1—*Beginner's Kit.* Consists of a Receiver BC 406 (UHF) which has an excellent power supply that can be used with a low powered transmitter. Included in Kit #1 are hook-up wire, transformers, resistors, condensers, and other miscellaneous items.

Kit #2—*Repair and Maintenance Kit.* This kit is designed for issue to *active* members. It contains an assortment of condensers, resistors, r. f. chokes, etc., for making station emergency repairs.

Kit #3—*Experimenter's Kit.* This kit contains just about everything left in the warehouse not appearing in the other two kits.

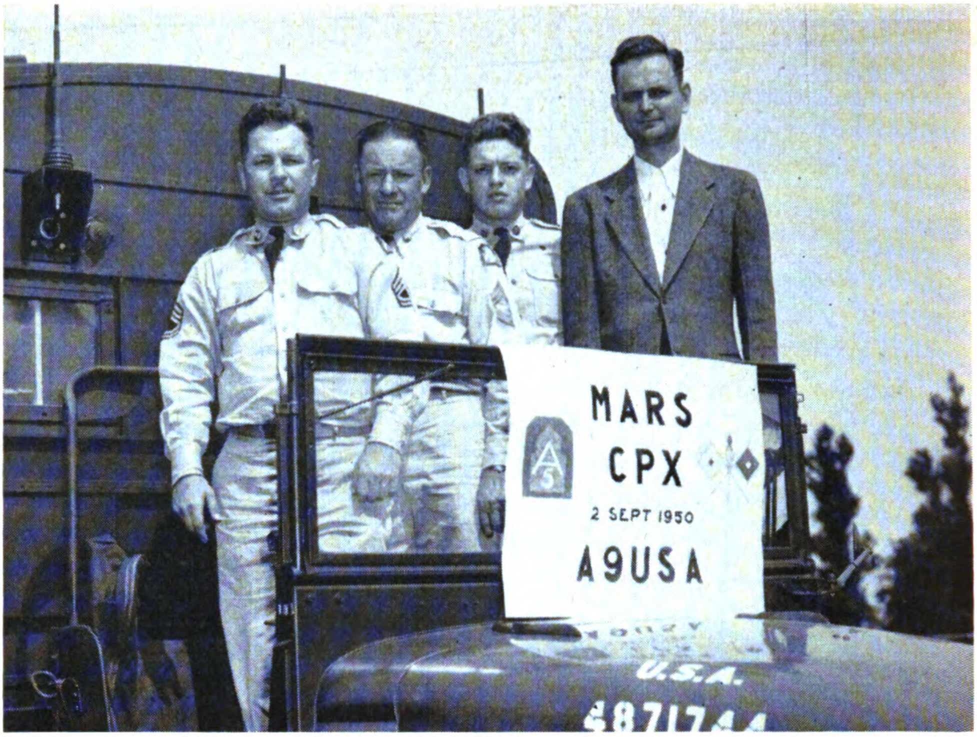
FOURTH ARMY

Captain Wood, Fourth Army MARS Director, has been busy with net reorganization within the Fourth Army. The titular chief of A5USA visited his area personally in an attempt to find out first hand what was needed in the way of MARS communication. The result was a complete revamping of the existing 4A CW nets and establishment of several phone nets on a local area basis.

Visitors to San Antonio will want to visit the new Fourth Army Headquarters MARS station, which boasts one of the new Collins KW–1 transmitters, an all-band, one kilowatt transmitter. The MARS station is expected to provide a secondary net control station and otherwise augment existing facilities for Fourth Army disaster and civil defense plans.

FIFTH ARMY

In Fifth Army area, MARS Director Bill Spanke continues to do a bang-up job, even though he lost money by trading in his tweed suit for khaki and a silver bar. Formerly a civilian employee at Fifth Army Headquarters, Bill is now a First Lieutenant and is Fifth Army Radio Officer as well as MARS Director. The number one priority for MARS in Fifth Army is being given to preparation for



Left to right Sergeant First Class Garl Danford, A9FSN; Master Sergeant Floyd E. Lynn, A9KUB; Corporal Frank R. Brown, A9JRV; and W. F. Spanke, A9CQU, Fifth Army MARS Director. This crew and the AN/GRC-26 (Angry 26) helped manufacture QRM on 3497.5, 4020, 4025, 4080, 4085, 6997.5, and 14405 kilocycles during the MARS CPX.

Sergeant First Class Anthony E. Welzel operates 20 meters at A6USA.

emergency back-up circuits that can tie in with civil defense and local area disaster service. Key stations are being spotted for point-to-point relay in this huge area which comprises Fifth Army. Major emphasis now is in location power supplies and mobile equipment to tie in with the skeleton network now in existence.

SIXTH ARMY

MARS, Sixth Army, recently underwent a reorganization which split the state of California into three major districts, and created statewide nets for Washington, Oregon, Utah, Arizona, and Montana.

Members with traffic destined for the Far East should keep in mind the daily sked A6USA now holds with Tokyo and Clark Field (P. I.) on MARS 10 meter frequency, 27994.

The Sixth Army MARS "boss" recently found his name on a promotion list and is now referred to officially as Captain John A. Downey.

USARPAC

Pacific Area has been testing 3497.5 kc with a view to shifting the 6997.5 kc traffic net in toto. Captain James Long, USARPAC Command Director, now has a full time assistant—Floyd C. Hurst, AB6UV.

A Pacific Emergency Net to operate on the MARS 6 MC frequency has been activated; AB6FX is net control; AB6UZ alternate and AB6UV and AB6AAG are the other charter members. It is planned to establish a permanent emergency station list. Drill credit will be given for all drill time.

The Command recently issued its Maintenance Kit #3. Plans are under way to build MARS socially also. A MARS dinner meeting is scheduled for sometime in early 1951.

Traffic handlers are reminded that AB6USA keeps regular skeds with Guam, Manila, and Tokyo in the Far East, and with A5USA and WAR stateside.

EUCOM

The Headquarters, U. S. Army, Europe, MARS BULLETINS show that Military Amateur Radio is "coming of age" in that headquarters.

Traffic schedules now are set up (both phone and CW) to link Berlin, Bremerhaven, Nuremberg, Munich, Stuttgart, Garmisch, Augsburg, Wetzlar, Wurzburg, Frankfurt, Wiesbaden, and Heidelberg. With 10 meters now open, EUCOM phone patches are getting a good workout.

Incidentally, the promotion board took care of EUCOM Director also; it now is Lieutenant Colonel Frank Chilton.

MAKE YOURSELF KNOWN!

MARSMEN who own and operate their own personal stations can be of invaluable service to their communities in times of local crises such as those caused by adverse weather conditions or other "Acts of God" that may interfere with normal communications. All amateurs stand ready and willing to give such emergency communications assistance as they are able.

But, in many cases, where individual MARS stations are standing by to provide communications assistance, their traffic loads prove disappointingly light—and sometimes nil—despite the great need for the very services they offer.

We suggest that each Martian get in touch with his local Red Cross people. Introduce yourself to your Disaster Service Chairman and let him know your station call, your address, and your telephone number. Don't wait; MAKE YOURSELF KNOWN NOW!

PRECISION FREQUENCY STANDARDS

Recordings of the drift rate of four type 0–76/U 100 kc frequency standard oscillators are being made at Signal Corps Enigneering Laboratories. The oscillators operated continuously for more than six months, with periodic checks being made against the carrier frequency of National Bureau of Standards Station WWV. The frequency drift rates averaged 4.0, 5.8, 6.2, and 10.4 cycles in 109 per 24 hours. The frequency changes were positive in sense and are attributed to aging of the 100 kc quartz plate. Observations revealed that the drift rate diminished with time with continued operation of the units.

ELECTRONIC VOLTAGE REGULATOR

A contract was recently awarded Industrial Electronics and Transformer Co., Los Angeles, Calif., for a theoretical and experimental study of electronic voltage regulating methods and devices for out-put voltages from 1.3 to 25 volts, at currents from 0 to 4 amperes.

MARS ARMY STATION LIST

FIRST ARMY

A1BCZ	Bernard P. Davis, 1 Victory Highway, Wickford, R. I.
A1BVF	Guy L. Ottinger, 83 Felch Road, Natick, Mass.
A1CWE	James W. Meek, 30 Pond Street, Dorchester 25, Mass.
A1DJV	Harry Paston, 85 Southwell Road, Wethersfield, Conn.
A1EMG	Richard P. Morris, 18 Whittier Street, Melrose, Mass.
A1FTV	Louis W. Sherwin, 52 Bartlett Street, Leominster, Mass.
A1GBQ	Roger C. Albiston, 641 East Avenue, Pawtucket, R. I.
A1HOV	Edward A. Boulay, 8 Highland, Concord, N. H.
A1HRY	Donald W. Scully, 12 Priscilla Road, Wellesley Hills, Mass.
A1HYS	Abe Sinelnikoff, 292 Hillside Avenue, Pawtucket, R. I.
A1IEQ	Gordon M. Cavanaugh, 34 Gilbert Street, North Brookfield, Mass.
A1IL	Raymond A. Nystrom, 36 Baltimore Avenue, Springfield, Mass.
A1ILN	Everett M. Adams, 166 Hope Street, Seekonk, Mass.
A1JJY	Charles L. Riley, Jr., 23 Harvard Avenue, Brookline 46, Mass.
A1JKO	Walter C. Newman, 49 Peach Street, South Braintree, Mass.
A1JOT	Theodore Simmington, Jr., 54 Marion Street, Brookline, Mass.
A1JSL	Frank L. Starrett, 7 Beacon Street, Derry, N. H.
A1KCP	Francis N. Saltus, 88 Ames Street, Quincy, Mass.
A1KHI	Theodore L. Parker, Old Conn. Path and Maiden Lane, Cochituate, Mass.
A1KMH	Harold C. Shepard, 41 Granite, Suncook, N. H.
A1KNT	Chester J. Osiecki, 65 Vine Street, Ansonia, Conn.
A1KPF	Frederick A. Thebado, 29 Woodland Drive, Framingham, Mass.
A1KRV	Joseph T. Steventon, Mt. Cushman Road, Rochester, Vt.
A1KUX	Wallace R. Calkins, 114 Holden Road, Paxton, Mass.
A1LOI	Harold A. Knapp, Jr., 45 Norwell Road, Dedham, Mass.
A1LOZ	Carl P. Rounds, 17 Oakland Street, Auburn, Maine.
A1LQZ	Victor A. Stancliff, 145 Dessa Drive, Hamden 14, Conn.
A1LVG	Adelbert J. Wood, Jr., 13 Lyndon, Concord, N. H.
A1LYM	Robert D. Sweeney, General Delivery, Northfieldfalls, Vt.
A1LZB	Wilmer D. Lanoue, 1564 Washington Street, South Braintree, Mass.
A1MDU	William P. Slichter, 10 Wyman Road, Cambridge, Mass.
A1MKP	Albert C. Jones, 51 Trebbe Drive, Manchester, Conn.
A1MMN	George J. Chandler, Jr., P. O. Box 108, Barré, Vt.
A1MPT	Edward J. Doherty, 88 Brook Road Ext., Quincy, Mass.
A1MQK	Malcolm L. Merchant, 251 Arthur Street, Springfield, Mass.
A1NET	Robert Ricker, 57 Welland Road, Weymouth 88, Mass.
A1NJZ	George L. Phillips, P. O. Box 1844, Fall River, Mass.
A1NN	Theodore C. Barron, 214 West Street, Reading, Mass.
A1NUH	Raymond G. Wilson, 18 Bramen Street, Danvers, Mass.
A1NYJ	Saul Cohen, 16 Fredette Road, Oak Park, Newton 59, Mass.
A1OIL	Roland G. Watier, 173 Highland Avenue, Gardiner, Maine.
A1OLM	Donald O. Erskine, 107 Main Street, Lyndonville, Vt.
A1OOC	Vincent J. Sadlowski, 169 Gale Avenue, Meriden, Conn.
A1OSE	Samuel M. Thomas, Ridgeview Avenue, Greenwich, Conn.
A1PBS	David A. Hinkley, Box 434, Barre, Mass.
A1PCN	Robert W. English, c/o United States Border Patrol, Houlton, Maine.
A1PDN	Alan Richard Works, Hillside Avenue, Rumford, Maine.
A1QEQ	John W. Jones, 258 Elizabeth Avenue, Bangor, Maine.
A1QEV	Seward R. Dinsmore, 37 Knox Street, Thomaston, Maine.
A1QGL	William R. Weiss, Jr., 109 Bellevue, West Roxbury, Mass.
A1QHU	Chester N. Wentworth, Jr., Box 158, RFD #3, Manchester, N. H.
A1QJH	Gerard L. Le Boeuf, Lowell Road, Hudson, N. H.
A1QMO	Fred P. Bowen, 51 Simpson Avenue, Somerville, Mass.
A1QPO	Francis X. MacDonough, Jr., 16 Bonad Road, Stoneham, Mass.
A1QQQ	Kenneth A. Smith, 36 Harvard Street, Melrose 76, Mass.
A1QXR	John J. Hennessey, 7 Catelle, Bangor, Maine.
A1QYL	Philip A. Nicoll, 59 Orient Avenue, Melrose 76, Mass.
A1QZI	Salvatore S. Salerno, 179 Macauley Avenue, Waterbury, Conn.

A1RBT	J. R. Schlesinger, 60 Center Avenue, Norwalk, Conn.
A1RCI	Wallace H. Watts, 90 Lewis Avenue, Meriden, Conn.
A1RCU	Arthur J. Gagnon, 125 Fairmount Avenue, Saugus, Mass.
A1RFW	Philip J. Lawrence, 53 Orchard Street, Cambridge 40, Mass.
A1RGB	Joseph M. Meyers, 71 West Main Street, Meriden, Conn.
A1RGH	Joseph G. Cheet, 24 Wellington Hill Street, Mattapan 26, Mass.
A1RHB	Thomas E. Nolan, Jr., 35 Hollingsworth, Boston 26, Mass.
A1RHP	Richard A. Day, Jr., 8B Union Street, Peterborough, N. H.
A1RHS	Joseph A. Guilbeault, 49 Lemoine, Nashua, N. H.
A1RJB	Earl L. Bartlett, Jr., 8 14th Street, Bangor, Maine.
A1RJI	Franklin W. Wiggin, Massachusetts NG Maint, Depot, Whittemore Ord. Cent., Ayer, Mass.
A1RJZ	Victor T. Shorten, 10 Elm Court, Andover, Mass.
A1RLV	Thaddeus J. Witowski, 854 Plumley Street, Ludlow, Mass.
A1RTA	Bernard P. Davis, 1 Victory Highway, Wickford, R. I.
A1RXE	Howard C. Arnold, 512 Elliott Street, Beverly, Mass.
A1RXY	1128th ASU Det. 3, University of Maine, Orono, Maine.
A1RYE	William P. Sullivan, 23 Edwin Street, Dorchester, Mass.
A1RYZ	Carlo Blasetti, 691 High Street, Randolph, Mass.
A1SBD	Curtis F. Keirstead, 10 Audrea Road, Framingham, Mass.
A1SDF	Nicholas S. Rahal, 8 Chichester Place, Danbury, Conn.
A1SHN	Irving R. Obenchain, Jr., 20 Henry Street, Winchester, Mass.
A1SHQ	Franklin L. McCutchen, King Street, Littleton, Mass.
A1SIE	Sing C. Chin, 24 Lee, Cambridge, Mass.
A1SIZ	Thomas F. Snyder, 384 Pakachoag, Auburn, Mass.
A1SJD	Robert J. Lessard, 113 Oxford Drive, East Hartford, Conn.
A1SJX	Rudolf H. Folts, Timberlane, Cochituate, Mass.
A1SLX	Joseph J. Heider, 1267th Det. #1, Bldg. 102, Rad. Sec., Fort Jay, N. Y.
A1SLZ	James F. O'Donnell, Jr., 4 Victor Street, Dorchester 25, Mass.
A1CMJ	John T. Blake, Old Oak Lane, Winchester, Mass.
A1SNN	Stirling M. Olberg, 316 North Harvard Street, Allston 34, Mass.
A1SPP	Edmund P. White, 17 Weston Street (Rear), Waltham, Mass.
A1SSG	William F. Dennen, Fort Banks, Winthrop, Mass.
A1SSO	Alice Sargent, 62 Cherry Street, Spencer, Mass.
A1SUI	Elwin Zygfryd Rybakiewicz, 5 Cottage Street, Morrisville, Vt.
A1SUJ	Richard N. Pann Co. "R," Signal Regt. Fort Monmouth, N. J.
A1TBM	Robert A. Jones, 24 Pearl Street, Charlestown, Mass.
A1TDY	John C. Lovci, Qrs 15C, Annex, Boston Naval Shipyard, Boston, Mass.
A1USA	Post Signal Officer, Hq Boston Army Base, Boston, Mass.
A1WAB	Paul I. Wells, Bldg P–2, Post Signal Office, Fort Devens, Mass.
A1WAC	26th Sig Co, Massachusetts NG, 191 Highland Avenue, Somerville, Mass.
A1WAF	Massachusetts NG, 347 Commonwealth Avenue, Boston, Mass.
A1WAG	3d Bn, 101 Inf, 26 Div Massachusetts NG, 1000 Hancock Street, Quincy, Mass.
A1WAH	1180th ASUROTC, Massachusetts Institute of Technology, Cambridge 39, Mass.
A1WAJ	747th AAA AW BN (M) MNG, 72 Bank Street, Fall River, Mass.
A1WAL	National Guard of New Hampshire, State House, Concord, N. H.
A2AAN	Stanley E. Hart, 64 Locust Hill Avenue, Yonkers 2, N. Y.
A2AAZ	Alexander M. Wessel, 461 Linden Boulevard, Brooklyn 3, N. Y.
A2ADQ	James E. Shannon, Apt. 1–J, 48–23 42d Street, Long Island City 4, N. Y.
A2AEO	Harry E. Rimbach, 1267 A. S. U., Bldg. 82, Fort Wadsworth, N. Y.
A2AHN	Everett N. Sieder, 850 Tice Place, Westfield, N. J
A2ANA	Joseph C. Gilliam, 103 Madison Avenue, Laurel Springs, N. J.
A2ARK	Milton J. Cavanagh, 37 Water Street, Perry, N. Y.
A2AWM	Robert E. Galloway, Bldg. 2027, Fort Monmouth, N. J.
A2AYG	Albert E. Chew, Jr., 1011 F Street, Belmar, N. J.
A2AZT	Joseph M. Keller, 154 Hancock Street, Franklin Square, Long Island, N. Y.
A2BBF	Howard R. Leistner, 333 Bay 10 Street, Brooklyn 28, N. Y.
A2BBK	James L. Evans, Jr., 254 Christie Heights Street, Leonia, N. J.
A2BJJ	Walter C. Bolduc, 97 Church Street, Schuylerville, N. Y.
A2BKN	Robert W. Schiemel, 90–26 208 Street, Queens Village 8, N. Y.
A2BKV	Guy H. Nicholson, 119–14 80 Road, Kew Gardens 15, N. Y.
A2BNF	John W. Woestman, 331 Leconey Avenue, Palmyra, N. J.
A2BO	Meylert A. McIntire, 1127 Glenwood Road, Brooklyn 30, N. Y.
A2BSK	Charles P. Carter, Bldg. 541, 497 Sig Svc Co. (Photo), Fort Monmouth, N. J.
A2BX	Merrill D. Beam, 118 Lewis Street, Eatontown, N. J.

A2CAA	Lloyd G. Morse, 72-72 112th Street, Forest Hills, Long Island, N. Y.
A2BCZ	Lawrence G. Forbes, Quarters 260, USMA, West Point, N. Y.
A2CDJ	William L. Magee, 2057 Hemphill Road, Fort Monmouth, N. J.
A2CEV	Guy Huse, 15 Peck Drive, Troy, N. Y.
A2CFV	William Frank Squires, 117 North Midler Avenue, Syracuse, N. Y.
A2COU	Joseph M. Belth, 245 Cambridge, Syracuse, N. Y.
A2CSA	Charles F. Brown, VC-33, NAS, Atlantic City, N. J.
A2CU	Charles F. Felstead, 109 Loring Road, Levittown, Long Island, N. Y.
A2DBD	Robert L. Klucheski, 219 Oxford Avenue, Fair Haven, N. J.
A2DBO	William J. McCausland, 1713 Tinsman Avenue, Merchantville 8, N. J.
A2DCY	John P. Warner, Jr., 14 MacAltioner Avenue, Woodstown, N. J.
A2DHE	Harold B. Lynn, 215 D Hancox Avenue, Nutley, N. J.
A2DHG	Victor A. Santore, Hamilton Street, Guilderland, N. Y.
A2DJJ	Robert E. Hertzberg, 2512 84th Street, Jackson Heights, N. Y.
A2DJK	Victor C. Warren, 301 Wyckoff Avenue, Ithaca, N. Y.
A2DOB	Ronald E. Quirk, Collendale A-13, Syracuse, N. Y.
A2DPG	Alvin J. Gutt, 201 Evesham Road, Runnemede, N. J.
A2DRM	Carl Bogart, 309 East 4th Street, New York 9, N. Y.
A2DUZ	James Harden, Jr., 565 West 183d Street, New York City, N. Y.
A2DVC	Walter C. Snyder, 1078 Gillespie Street, Schenectady, N. Y.
A2DYW	William M. Williams, Rolling Acres Farm, Middletown, N. J.
A2EBZ	Clayton A. Coll, 223 West 14th Street, New York 11, N. Y.
A2EFV	Judson Vanderhoof, 22 Chapel Street, Brooklyn, N. Y.
A2ELU	Carlton A. LeBeau, 109 River Street, State Armory, Saranac Lake, N. Y.
A2EMM	Louis Tischler, 348 Wall Street, Eatontown, N. J.
A2ENP	Martin Schiff, 2776 Jerome Avenue, New York 58, N. Y.
A2EQD	Frederick J. Skinner, 500 Wolfs Lane, Pelham 65, N. Y.
A2EQN	John Sylvester Brown, 1626 Sedgwick Avenue, Bronx 53, New York, N. Y.
A2ESM	S. Guy Blencoe, Quarters 114-21, West Point, N. Y.
A2EVF	James F. Bannan, Box 71, Eatontown, N. J.
A2EWZ	Harry H. Bowers, 443 West 4th Avenue, Garwood, N. J.
A2FAW	207th AAA Group NYNG, 195 Washington Avenue, Albany, N. Y.
A2FEN	Charles R. Wagner, 812 New Scotland Avenue, Albany 3, N. Y.
A2FII	Jose R. Atienza, Co "A" 24th Signal Svc Bn, Fort Wadsworth, N. Y.
A2FPY	James F. MacLennan, 548 North 12th Street, New Hyde Park, Long Island, N. Y.
A2FQH	Gerritt H. Stekeur, 250 Delaware Avenue, Albany 2, N. Y.
A2GGP	John J. Purcell, New York State Armory, Troy, N. Y.
A2GLL	Joseph A. Calamari, 201 East 127th St., New York, N. Y.
A2GMY	William L. Haas, 41 Broad Street, Perth Amboy, N. J.
A2HCE	Francis A. Treadwell, R-137 Pavilion Avenue, Long Branch, N. J.
A2HNY	Madison P. Rehm, Washington Drive, Watchung, N. J.
A2HSA	Gerald J. Brown, 9 Fairmount Terrace, Jersey City, N. J.
A2HTX	LeRoy A. Woodruff, 11 Parkway Village, Cranford, N. J.
A2IAZ	Frank A. Mohler, 86 Lewis Street, Eatontown, N. J.
A2IFW	Ronald Keeton, 455 102d Street, Niagara Falls, N. Y.
A2IUG	Paul Kaufman, 125 South Harrison Street. East Orange, N. J.
A2IXZ	Daniel T. Brosnan, 245 East 51st Street, New York, N. Y.
A2JDM	Milton L. Berlin, 24 Livingston Avenue, Arlington, N. J.
A2JE	Augustine J. Gironda, 1417 Stonybrook Avenue, Mamaroneck, N. Y.
A2JRT	Clinton A. Gould, 113-12 Myrtle Avenue, Richmond Hill, N. Y.
A2KG	William P. Schweitzer, 897 Westminster Avenue, Hillside, N. J.
A2KGY	Cadet Radio Club, U. S. Military Academy, Bldg. 636, West Point, N. Y.
A2KLD	Leon David Held, 3260 Corsa Avenue, Bronx 67, N. Y.
A2KR	Morton B. Kahn, 22 Birch Hill Road, Great Neck, Long Island, N. Y.
A2KZZ	John F. Buzerak, 57 Colin Street, Yonkers 2, N. Y.
A2LDX	Alfred N. Steiner, 355 Wyoming Avenue, Millburn, N. J.
A2LRW	Marcel C. Reeds, Box 200, Gifford Road, RD No. 5, Schenectady, N. Y.
A2LSL	George D. Bailey, 76-47 271st Street, New Hyde Park, Long Island, N. Y.
A2MLB	Donald C. Mead, Jr., 116 Willow Street, Brooklyn 2, N. Y.
A2MLI	John M. Bialo, 318 East 19th Street, New York 3, N. Y.
A2MLM	Carl Lindemann, Jr., 17 Maple Avenue, Hackensack, N. J.
A2MON	Raymond F. Kubiszewski, The Signal School, Bldg. 498, Ft. Monmouth, N. J.
A2MUM	Elliott Wolheim, 41 Silversmith Lane, Levittown, Long Island, N. Y.
A2MUS	George M. Simmons, 370 1st Avenue, New York 10, N. Y.
A2NAP	Herbert R. Burns, Jr., NROTC, Hartley Hall, Columbia University, New York, N. Y.

A2NAW	Charles W. Blauvelt, 238–78 116th Road, Elmont, Long Island, N. Y.
A2NJU	John W. Nutter, Auborn Avenue, South Haven, Long Island, N. Y.
A2NKD	Thomas J. Ryan, Jr., 1082 Anna Street, Elizabeth, N. J.
A2NXX	Charles A. Karpins, Co "A," 9400 TSU—Sig C, Fort Monmouth, N. J.
A2NY	Herman A. Bohning, 101st Sig Bn, New York NG, 127 North Broadway, Yonkers, N. Y.
A2OAU	Roland J. Fitzgerald, 15 Canterbury Road, Great Neck, N. Y.
A2OBG	Bennie R. Potts, 163 Bremond, Belleville, N. J.
A2OUB	John H. Schulte, Apt. 10A, Bldg. 2057, Hemp Hill Road, Fort Monmouth, N. J.
A2OUU	Samuel Hecht, 221 Clark Street, Hillside, N. J.
A2OXC	Martin L. Feigenbaum, 80 Ramsdell Avenue, Buffalo, N. Y.
A2OXU	Ronald J. Ralston, 575 West Delavan Avenue, Buffalo, N. Y.
A2PBL	Deane H. Uptegrove, Jr., 30 Barnsdale Road, Short Hills, N. J.
A2PCR	Leo M. Levens, 2000 Anthony Avenue, New York 57, N. Y.
A2PF	David Talley, 130 Martense Street, Brooklyn 26, N. Y.
A2PHO	Alfred P. Lane, 21 Bonnett Avenue, Larchmont, N. Y.
A2PPB	LeRoy A. Mullin, Jr., 846 Westmoreland Avenue, Syracuse, N. Y.
A2QUT	Andrew Malan, 32–34 33d Street, Long Island City 2, N. Y.
A2RAW	Arthur M. Gravlin, RFD No. 2, Ashville, N. Y.
A2RWH	Carl A. Emerson, P. O. Box 157, Watertown, N. Y.
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A2RZT	Arthur E. Duble, Holmdel Road, Hazlet, N. J.
A2SAF	James T. Larmon, 2341 Andrews Avenue, New York 53, N. Y.
A2SJU	George H. Russell, 16 Peter Circle, Cranford, N. J.
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A2TMI	Kenneth R. Palmer, 112 Lake Avenue, Blasdell 19, N. Y.
A2TOK	Gerald Rudd, 120 East Main, Norwich, N. Y.
A2TRN	Rutgers University, ROTC, Sig C, New Brunswick, N. J.
A2TSJ	William Wilson, 122 South Maryland Avenue, Atlantic City, N. J.
A2TSL	Charles K. Cambell, 2053 Hope Road, Fort Monmouth, N. J.
A2TUD	Richard S. Buchholz, 2057 Hemphill Road, Fort Monmouth, N. J.
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A2TXU	William R. Cornell, 9 Poplar Street, Hudson Falls, N. Y.
A2UDS	Harold E. Lathom, 97 Bloomfield Avenue, Fords, N. J.
A2UGW	Albert M. Elliott, 38–27 221st Street, Bayside, Long Island, N. Y.
A2UMB	L. T. Meister, 1526 Schley Street, Hillside, N. J.
A2UNS	Wayne R. Stone, 34 Harte Street, Baldwin, N. Y.
A2UPI	Roswell E. Lewis, 225 Crystal Street, North Arlington, N. J.
A2UPY	Andrew J. Ostrochovsky, 235 Spring Street, Paterson, N. J.
A2USA	Signal Section, Hq First Army, Governors Island, New York 4, N. Y.
A2USE	John T. Piechowski, 311 Union Street, Trenton 10, N. J.
A2USV	Irving C. Miller, 9½ West William Street, Bath, N. Y.
A2UTU	John S. Brown, 445 Bergen Avenue, Jersey City, N. J.
A2UUI	Claude A. Roichel-Kagan, 1212 Fifth Avenue, New York City, N. Y.
A2UYU	Leslie C. Hindman, Bldg. T–225, Apt D, Fort Jay, Governers Island, N. Y.
A2VGQ	Robert J. Wood, 191 Locust Avenue, Babylon, N. Y.
A2VJU	Warren G. Smith, 181 South Avenue, Mariners Harbor, N. Y.
A2VKL	Arthur L. Skinner, Robbins Road, Shark River Hills, RFD #2, Box 275A Neptune, N. J.
A2VOH	Carmen Anello, 81 Ellis Avenue, Irvington, N. J.
A2VQA	Stanley R. Dickstein, 2083 Creston Avenue, Bronx, N. Y.
A2VRB	Frank J. Hollister, 26 Townsend Street, Glen Head, Long Island, N. Y.
A2VRC	Mark E. Goldes, 119–26 219th Street, Cambria Heights, 11, Long Island, N. Y.
A2VTO	Gerald C. Rosenstein, 529 West 111th Street, New York 25, N. Y.
A2VU	Samuel S. Kale, 31 North Lenape Avenue, Trenton, N. J.
A2VVN	Stephen E. Lipsky, 574 West End Avenue, New York 24, N. Y.
A2VWC	George V. Wintriss, 600 University Avenue, Ithaca, N. Y.
A2VWQ	Wilmah M. Getchell, 57 Corlies Avenue, Eatontown, N. J.
A2VXW	Robert R. Baird, 9 Floyd Avenue, Bloomfield, N. J.
A2VZG	Richard E. Seifert, 101 Linn Street, Ithaca, N. Y.
A2VZL	Donald E. Udey, 606 Utica, Ithaca, N. Y.

FIRST ARMY—Continued

A2VZM	Joseph G. McGettigan, 1880 North 42d Street, Pennsauken, N. J.
A2WAC	Signal Corps Photographic Center, Long Island City 1, N. Y.
A2WAD	Fort Jay, Bldg. 15, Post Signal Office, Fort Jay, N. Y.
A2WAE	Signal Div. New York Port of Embarkation, Brooklyn, N. Y.
A2WAF	1286th ASU ROTC, New York University, 181st Street and University Avenue, Bronx 53, N. Y.
A2WAG	1281st ASU Cornell University, Ithaca, N. Y.
A2WAH	50th Armored Sig. Co., New Jersey NG, 176 Sussex Avenue, Newark, N. J.
A2WAR	Peter J. Ryan, Kearny Navy Yard, Kearny, N. J.
A2WDK	Signal School, Bldg. 2240, Fort Monmouth, N. J.
A2WGZ	Sven Spoerri, Smith Street, Blue Point, Long Island, N. Y.
A2WJK	James W. Hudgins, Bldg. 539, Fort Monmouth, N. J.
A2WJX	Charles Rosenberg, 60–54 75th Lane, Elmhurst, Long Island, N. Y.
A2WKI	Henry D. Twitchell, Jr., 294 West 2d Street, Apt 4, Moorestown, N. J.
A2WLW	John S. Forrester, 230 West 79th Street, New York 24, N. Y.
A2WQU	Carl R. McCoy, 60 High Street, Walton, N. Y.
A2WRB	Francis M. Sulzman, 429 East Allen Street, Hudson, N. Y.
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A2WSM	Fortunato D. Cavallari, 143 Bay 10th Street, Brooklyn, N. Y.
A2WSS	Peter J. Gellert, Manhattan Avenue, Rye, N. Y.
A2WTD	Bernard Lippner, 15 Floral Lane, Yonkers, N. Y.
A2WUC	Harry W. Deas, 1011 Lafayette Avenue, Brooklyn, N. Y.
A2WWO	Merrick B. Price, 32 Vick Park B, Rochester 7, N. Y.
A2WXC	Frank T. Haas, Apt 4, Bldg. 2014, Fort Monmouth, N. J.
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A2YRH	Tyler C. Stewart, 942 Ackerman Avenue, Syracuse, N. Y.
A2YTL	George C. Wetmore, Beaver Dam Road, RFD #1, Selkirk, N. Y.
A2YVK	Clyde C. Upchurch, RFD #2, Higbie La., Babylon, Long Island, N. Y.
A2YYC	Alva E. Smith, 834 Berckman Street, Plainfield, N. J.
A2ZAE	Burton P. Williams, 429 West Graisbury Avenue, Audubon, N. J.
A2ZDB	Alfred C. Jones, Jr., 63 Parkside Drive, Roslyn Heights, N. Y.
A2ZDC	Steve A. Arias, 875 Irvine Street, Bronx 59, N. Y.
A2ZGL	Kellogg Sloan, 14 Hampton Road, Cranford, N. J.
A2ZLA	Charles E. Walsh, Jr., New Scotland Avenue, Armory, Albany 3, N. Y.
A2ZLF	Herbert Friedman, 4091 Bedford Avenue, Brooklyn 29, N. Y.
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A2ZQZ	Benjamin F. Poinsett, 2311 Washington Avenue, Seaford, N. Y.
A2ZRR	Tracy S. Storer, 114 Founders Hall, Cornell University, Ithaca, N. Y.
A2ZSG	Richard T. Kenyon, 924 Ackerman Avenue, Syracuse, N. Y.
A2ZYF	Clarence A. McComber, RFD #2, Oswego, N. Y.
A2ZZD	Joseph H. Nolin, Jr., 48 Main Street, Cohoes, N. Y.
	Louis Galambos, Apt 812–A, Station Hospital, Lewes, Del.
	Joseph G. Pase, 2401 Bayview Avenue, Lewes, Del.
A5IJW	Raymond C. Zongker, 301st Sig Rad Maintenance Unit, Camp Edwards, Mass.
A5LOC	Charles A. Perreault, 301st Sig Rad Maintenance Unit, Camp Edwards, Mass.
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A1QLA	James DeVita, 252 Bremen Street, East Boston 28, Mass.
A2BRX	Charles J. Yopp, 1013 3d Avenue, Asbury Park, N. J.
A2CTI	Karl A. Woehrer, 614 Woodland, Avon-By-The-Sea, N. J.
A2HUI	George H. Shoemaker, Sr., 20 Norwood Avenue, Brooklyn 8, N. Y.
A2IN	George T. Droste, 203 East 202d Street, New York City 58, N. Y.
A2LMB	Herman E. Schreiber, 622 Overton Place, Long Branch, N. J.
A2NVB	Otis H. Trowbridge, 1396 Park Lane, Pelham Manor 65, N. Y.
A2ORS	Charles B. Roop, 201 Pavilion Avenue, Riverside, N. J.
A2OUS	Eric Leavens, 5 Alston Court, Red Bank, N. J.
A2TXI	Robert D. Mersey, 118 Franklin Avenue, Lynbrook, N. Y.
A2YGY	William M. Ford, Box 414, Leonardo, N. J.
A2ZDH	Shirley I. Burke, 104 Hillcrest Drive, Dumont, N. J.
A2ZVL	David I. Siegel, 43 Webster Avenue, Brooklyn 30, N. Y.

SECOND ARMY

A3AKR	Laurence J. Holt, 412 Quackenbos Street NW., Washington, D. C.
A3ANK	William H. Hurst, 6321 Baynton, Philadelphia, Pa.
A3AX	Alton R. Hart, 808 21st Street NW., Washington, D. C.
A3BTP	Frank L. Ziegler, Jr., East Market Street, Marietta, Pa.
A3BYF	Preston R. Schuler, 626 North Poplar Street, Allentown, Pa.
A3CGE	Herman A. Hanemann, 312 Thurston Avenue, Ithaca, N. Y.
A3CLY	Peter Bertelli, BOQ, Naval Receiving Station, Washington, D. C.
A3DGT	Ray R. Usilton, Co B, ASAS Bn. Carlisle Barracks, Pa.
A3DOH	William B. Smith, 5047 MacArthur Boulevard, Washington 16, D. C.
A3DQB	Lyman C. Millard, Jr., 4213 4th Street SE., Washington, D. C.
A3DUE	Lawrence R. Sutherland, Qrs 110, Forest Glen Sec, Walter Reed Hospital, Washington 12, D. C.
A3EAX	University of Maryland Amateur Radio Association, P. O. Box 88, Maryland University, College Park, Md.
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A3ECP	Edwin S. Van Deusen, 3711 McKinley Street NW., Washington 15, D. C.
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A3EHA	Cyrus F. Jones, 1004 Columbia Road, Hagerstown, Md.
A3ELI	George S. Van Dyke, Jr., 4607 Convent Avenue, Philadelphia 14, Pa.
A3ERP	Aaron H. Getzel, 5021 Ludlow Street, Philadelphia, Pa.
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A3FFM	Robert U. Mawby, 1560 East Berks Street, Philadelphia, Pa.
A3FQH	Howard M. Burns, Jr., 920 Bedford Street, Cumberland, Md.
A3GJY	John F. Wojtkiewicz, 434 Glenwood Drive, Ambridge, Pa.
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A3GSL	Albert M. Petrilli, 6609 Greenway Avenue, Philadelphia 42, Pa.
A3HCE	James T. Conner, Bldg T–245, Apt C, Fort George G. Meade, Md.
A3HIX	John Specialny, Jr., RFD #3, Quakertown, Pa.
A3HLE	Hugh E. Windland, Friendship, Md.
A3HSR	John W. Munnell, RD #3, Spring Grove, Pa.
A3HUW	William H. Roadstrum, 523 1st Street, Eastport, Md.
A3HWV	William W. S. Benner, 412 West Raymond Street, Philadelphia, Pa.
A3HZK	Lynford R. Hampton, 902 Pennsylvania Avenue, Wilmington Manor, Del.
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A3ICS	Edward J. Mueller, 2858 Rayner Avenue, Baltimore, Md.
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A3JTQ	Howard A. Walker, Hq & Hq Det, AFIS, Carlisle, Pa.
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A3JVR	Theodore L. Reuwer, 331 Locust Avenue, Annapolis, Md.
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A3JZV	Russell B. Hutchinson, 810 Greenhill Road, Buena Vista, Pittsburgh 9 Pa.
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A3KCV	Paul J. Cressman, 121 Arlington Street, Johnstown, Pa.
A3KDF	John H. Possehl, Jr., 1309 Wyoming Avenue, Philadelphia 40, Pa.
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A3KNK	Sherwood W. Doughman, 704 Crozier Avenue, Clearfield, Pa.

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A3KVV	Charles J. Murphy, RD #6, Butler Road, New Castle, Pa.
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A3MMY	Merle W. Henry, Corner 2d and Maple, Indiana, Pa.
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A3MZR	Domenico Cicalese, 1115 Snyder Avenue, Philadelphia, Pa.
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A3NLS	Karl G. Leono, Army Radio Sta, WAR, P. O. Box 30, Fort Myer, Va.
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A3NQK	Robert W. Zens, 4208 River Road NW., Washington 16, D. C.
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A3NRY	David L. McConaughy, 10519 Frankstown, Pittsburgh 21, Pa.
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A3NTK	Joseph P. C. Martineau, Combs Place, Hollywood, Md.
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A3NZE	George W. Kurtz, 253 Lothrop Street, Pittsburgh 4, Pa.
A3NZO	Robert H. Herrman, 1623 Stonewood Road, Baltimore, Md.

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A3OHV	Charles F. Scheid, Quigley Hall #2, Lock Haven, Pa.
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A3PCI	Benjamin A. Tankersley, 47 Wheatley Street, Kensington, Md.
A3PDM	George M. Farrier, 629 Pine Street, Lancaster, Pa.
A3PEK	Vincent J. Guarna, 1119 Scott Street, Kulpmont, Pa.
A3PEL	Marcos S. Gulas, 507 South LeHigh Street, Baltimore 24, Md.
A3PEQ	Robert T. Blanks, III, 8508 Parkhill Drive, Bethesda, Md.
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A3PGO	Baltimore Signal Depot Radio Club, Baltimore Sig Dep, Middle River, Baltimore 20, Md.
A3PIP	Walter Osmun, Jr., Co B, 51st Sig Opn Bn, Fort George G. Meade, Md.
A3PJE	Leon A. Cookman, 356–A Mayfair Boulevard, Columbus, Ohio.
A3PJM	David H. Phillips, 4117 Woodberry Street, Hyattsville, Md.
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A3PQC	Robert J. Smith, MEMQ 734F, Naval Air Station, Patuxent River, Md.
A3PRV	Robert D. Woosley, BOQ 1536, Army Chemical Center, Md.
A3PTY	Joseph E. Riplinger, 217 Audrey Lane, Apt 403, Washington 20, D. C.
A3PVN	Carlisle Barracks Amateur Radio Society, Carlisle Barracks, Pa.
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A3QAY	David L. Mott, 7060 Eastern Avenue, Washington 12, D. C.
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A8WAI	2766th Sig Svc Bn, 425 West Market Street, Akron, Ohio.
A8WAJ	374th FA Bn, 100th AB Div, 308 North 4th Street, Clarksburg, W. Va.

A8WAK	Hq 150th Inf RCT, West Virginia NG, 404 Kanawha Boulevard, Charleston, W. Va.
A8WAL	Arthur A. Bennett, Columbus General Depot, Columbus, Ohio.
A8WAO	Hq & Hq Co 107th Armored Cav Regt, 2500 East 130th Street, Cleveland, Ohio.
A8WAP	Hq 148th Inf, The Armory, 965 Wall Street, Toledo, Ohio.
A8WAQ	9425th ORTSU, Plant Engineering Agency, 303 Keowee Street, Dayton, Ohio.
A8WAX	Unit Instr Office, ORC, 132 East High Street, Springfield, Ohio.
A8WDQ	Robert L. Brewster, 2815 Euclid Heights Boulevard, Cleveland, Ohio.
A8WJN	Clayton R. Henry, Jr., 2504 Parkview Avenue, Toledo, Ohio.
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A8WZQ	Jack R. Porter, Box 2, Foster, Ohio.
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A8YEB	Emmett G. Marsh, 1444 Alameda Avenue, Lakewood 7, Ohio.
A8YEG	Donald E. Wiggins, 115 West Russell Avenue, West Lafayette, Ohio.
A8YEW	Nathan B. Crane, Jr., 1920 Stratford Way, Columbus, Ohio.
A8YHM	Gerald R. McCasland, 1911 Erie Avenue, Springfield, Ohio.
A8YNA	John E. Westphal, 1203 Heston, Toledo, Ohio.
A8YNI	Alexander C. Keyl, 1091 East 114th Street, Cleveland, Ohio.
A8YNU	Rudolph E. Magill, 322 Cherry Street, Holgate, Ohio.
A8YPS	Zenn Z. Zenon, 3620 Fulton Road, Cleveland 9, Ohio.
A8YPT	Harold J. Braschwitz, 3662 West 138th Street, Cleveland, Ohio.
A8ZCT	Gene R. Liggett, 420 East 14th Avenue, Columbus, Ohio.
A8ZGD	James B. Ottney, 991 East 131st Street, Cleveland, Ohio.
A8ZHN	Calvin C. White, 1730 Darst Street, Charleston, W. Va.
A8ZLC	Walter J. Harpen, 1832 Dorr Street, Toledo, Ohio.
A8ZSB	J. Arthur Dawson, Jr., 207 North Zane Highway, Martins Ferry, Ohio.
A8ZVW	James Young, 2120 East 106th Street, Cleveland 6, Ohio.
A8ZZY	Charles D. Buckshorn, 3568 Wilson Avenue, Cincinnati, Ohio.
A1SNU	William H. Wagner, Hq & Hq Co, 102d Inf Regt, Camp Pickett, Va.
A1SZV	Herbert M. Stuart, Co B, ASAS 8622 AAU, Carlisle Barracks, Pa.
A1TCX	Nicholas A. Amente, Hq Btry, 192 FA Bn, 43d Inf Div, Camp Pickett, Va.
A4LAT	Raymond L. Hayes, 3819 East Third Street, Dayton, Ohio.
A9DCG	Ralph E. Moorhouse, Amateur Radio Station, Carlisle Barracks, Pa.
AØBUX	Robert C. Lindsey, Co A ASA Sch Bn 8622 AAU, Carlisle Barracks, Pa.
AØBXS	Donald C. Bradley, Co A 8622 AAU ASA Sch Bn, Carlisle Barracks, Pa.
AØLVE	Richard V. Jenkins, CIC Center, Fort Holabird 19, Md.
AØNNJ	Robert E. Babb, Co C ASA Sch Bn, 8622 AAU, Carlisle Barracks, Pa.
A8GXR	Roger J. Jones, Jr., 98 Elmwood Place, Athens, Ohio.
A3JQN	Albert J. Dalton, 1007 Paul Drive, Rockville, Md.
A3KBE	Wayne McVeigh Eller, 1705 Lamont Street NW., Washington, D. C.
A3KRQ	James A. DeWald, RFD #3, Danville, Pa.
A3KSJ	George W. Friend, Box 272, RFD #1, Lewis Run Road, Clairton, Pa.
A3LNW	Virgil E. Neilly, 1108 South Atherton Street, State College, Pa.
A4PDP	James N. Moon, Jr., 4301 Tremont Street, Lynchburg, Va.
A3PHT	Arthur H. Goldstrom, 1809 Eutaw Place, Baltimore 17, Md.
A3PWB	Walter C. Lockhart, Jr., 4201 Yuma Street NW., Washington 16, D. C.
A3RAA	James W. O'Brien, Jr., 7236 Bradford Street, Philadelphia, Pa.
A3SCB	Morris Fagotti, 1023 West Pine Street, Shamokin, Pa.
A4PAH	Robert E. Lane, Hiltons, Va.
A8WAZ	Hq, 2d Bn, 145th Inf, ONG, Market and South Street, Shreve, Ohio.
AØBYU	Raymond L. McSherry, 17th Sig Svc Co, South Post, Fort Myer, Va.

THIRD ARMY

A4ACB	Samuel M. Douglas, Jr., 1228 North Duval Street, Tallahassee, Fla.
A4AON	Eddie J. Carmichael, 128 NW 18th Avenue, Miami, Fla.
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A4BD	Willard L. Anspach, 201 Louisiana Avenue, Signal Mountain, Tenn.
A4BFQ	Glenn C. Diggs, 616 South Liberty, Winston-Salem, N. C.
A4BGW	Frank H. Fogel, 2606 Hazel Street, Augusta, Ga.
A4BKN	C. Edward Miller, Jr., 603 Bunkers Cove Road, Panama City, Fla.
A4CBF	Brooks E. Going, 425 Chestnut Drive, Jacksonville, Fla.
A4CCJ	James H. Huggins, 1454 West Ridge Road SW., Atlanta, Ga.
A4CDV	Joseph L. Ruple, 214 Hoyle Avenue, Bay Minette, Ala.

A4CGY	Wilbur D. Fulton, 1903 Woodmere Drive, Jacksonville, Fla.
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A4KIL	Frederick H. Powell, Jr., Communications Officer, 224th AAA Group, Camp Stewart, Ga.
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A4MTW	Christopher P. Acklin, Tr. #1, Box 150, Johns Island, S. C.
A4MVM	Marc Molyneux, Jr., 53 Gulf Street, Chickasaw, Ala.
A4NCW	Stewart J. Baker, Hq Co 325th AIR, Fort Bragg, N. C.
A4NFF	Phillip F. Hoover, Qrs 115, Fort Bragg, N. C.

A4NGL	Gillis G. Cook, Sr., 2853 Pleasant Valley Road, Mobile, Ala.
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A4NPL	James Indindoli, Thorne Street, Evergreen, Ala.
A4NRG	Louis J. Dupree, Jr., 505 LaRogue Avenue, Kinston, N. C.
A4NXU	Paul A. Davis, 610 South Bayou Street, Mobile, Ala.
A4NZM	Jack M. Yerkes, 1607 Claudia Street, Mobile, Ala.
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A4ODS	Edward M. Phillips, Rt #4, Oneonta, Ala.
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A4OSP	Charles V. Wilson, Qrs 7, Fort Bragg, N. C.
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A4OUZ	Warren W. Watson, 1218 Cumberland Road, Jacksonville, Fla.
A4OVE	Vance V. Vogel, Box 41, Gibsonton, Fla.
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A4PAN	Norman H. Hobbs, Rt #1, Shiloh, Ga.
A4PBA	Rod F. Meaney, Smoke Bomb Hill Area, Fort Bragg, N. C.
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A4PGU	Hugh W. White, 55 Delmont Drive, Atlanta, Ga.
A4PIQ	Albert S. Browning III, 3241 ASU ROTC, North Carolina State College, Raleigh, N. C.
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A4PQZ	Olin E. McNeely, 103 North Clemson Avenue, Clemson, S. C.
A4PTZ	Jack R. Carson, Georgia Avenue, Commerce, Ga.
A4PUK	Stanley J. Dvorak, 317 New Bern Avenue, Raleigh, N. C.
A4PWR	William D. Croom, 1821 East Gaston Street, Savannah, Ga.
A4QAT	Minter A. Patterson, 2607 Old Shell Road, Mobile, Ala.
A4QAZ	Richard P. Austin, North Carolina State College of Agriculture and Engineering, Raleigh, N. C.
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A4QDN	Carl L. Acree, Box 111, Parkton, N. C.
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A4RCG	Albert E. Burkett, 708 Broadway, Daytona Beach, Fla.
A4RDP	Charles F. Janes, Stu Co #11, STR, Camp Gordon, Ga.
A4RER	William C. Cash, 504 East Meeting, Morganton, N. C.
A4RHV	Francis P. Vivier, 1107 South 20th Street, Birmingham, Ala.
A4RHW	John H. Honour, Redstone Arsenal, Huntsville, Ala.
A4RJH	Frank R. Falk, 38A Owens Court NAAS Whiting Field, Milton, Fla.
A4RJJ	Maurice H. Boutelle, Apt 2, Bldg 1519, Ft. McPherson, Ga.
A4RMD	Joseph G. Elliott, 835 37th Street, West Palm Beach, Fla.
A4RNN	Emmett L. Luke, 575 Riverside Avenue, Jacksonville, Fla.
A4RQN	Durward F. Silas, 3527 Pinecrest Street, Jacksonville, Fla.
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A4RSK	Jack C. Harden, 430 South Washington Street, College Park, Ga.
A4RSQ	John W. Wells, RFD #4, Box 530, Fayetteville, N. C.
A4RUG	William V. Yocum, 217 Oak Grove Street, Florence, Ala.
A4RVE	Ward S. Atherton, 8810th TSU, Criminal Invest Lab, Camp Gordon, Ga.
A4RXG	Alfred B. Leonard, 225 South Cherry Street, Winston-Salem, N. C.
A4RXJ	Ralph T. George, South Carolina Industrial School, Florence, S. C.
A4RYH	Lanvale L. Reese, 609 English Street, High Point, N. C.
A4RZN	James Taylor, 318 Sims Avenue, Augusta, Ga.
A4RZO	Milton N. Carlson, Hq Btry, 216th AAA Gp, Camp Stewart, Ga.
A4SAL	Howard T. Orr, Jr., H & S Co. 109th Engr (c) Bn, Fort Bragg, N. C.
A4SCG	Lawrence E. Boellhoff, Hq Btry, 190th FA Gp, Camp Rucker, Ala.
A4TIS	Infantry School, Bldg 1827, Ft. Benning, Ga.
A4USA	Headquarters, Third Army, Fort McPherson, Ga.
A4WAE	University of Alabama, Bldg HO. 17, University, Ala.
A4WAI	3241 ASU ROTC, North Carolina State College, Raleigh, N. C.
A4WAL	82nd Airborne Signal Co. Bldg T9–1181, Kere Street, Fort Bragg, N. C.
A4WAN	Bartow Office of Unit Instructor, ORC, Camp Byron, Bartow, Fla.
A4WAO	John M. Dortch, 173d Armd Cav Regt, NG Armory, Bldg 1660 Thompson Lane, Nashville, Tenn.

THIRD ARMY—Continued

A4WAP	Hq Florida Military District, 575 Riverside Avenue, Jacksonville, Fla.
A4WAQ	Tampa Military Sub-District, ORC, Block 7-C, Drew Field, P. O. Box 4178, Tampa 7, Fla.
A4WAR	Camp Gordon Radio Club, Bldg 24603, Camp Gordon, Ga.
A4WAS	ORC, Miami Military District, Miami International Airport, Miami, Fla.
A4WAX	Office of Unit Instructor, ORC, P. O. Box 86, West Palm Beach, Fla.
A4WAY	Tallahassee Military Sub-District, Bldg 100, Dale Mabry Field, Tallahassee, Fla.
A4WAZ	Gainesville Office of Unit Instructor, ORC, Florida Military District, Gainsville, Fla.
A4WBA	313th Sig Inf & Mon Co, 1306 Street, Stephens Road, Mobile, Ala.
A4WBB	Senior Instructor, ORC Instructor Group, 302 City Hall Building, St. Petersburg, Fla.
A4WBF	Hq Tennessee Military District, Franklin Road at Berry Lane, Nashville, Tenn.
A4WBH	Office of Unit Instructors, ORC, Jacksonville, Fla.
A4WBJ	Pensacola Office of Unit Instructor, ORC, Camp Franklin, Pensacola, Fla.
A4WBK	Hq North Carolina Military District, 118 West Hargett Street, Raleigh, N. C.
A4WBL	Office of the Unit Instructor, ORC, 669 Ponce de Leon Avenue NE., Atlanta, Ga.
A4WBN	ORC, South Carolina Military District, 1401 Hampton Street, Columbia. S. C.
A4WBP	Atlanta General Depot, Atlanta, Ga.
A4WBQ	Birmingham Office of Unit Instructor, ORC, Alabama Military District, Calder Building, Birmingham 3, Ala.
A4WBX	Post Signal Office, Redstone Arsenal, Huntsville, Ala.
A4WCE	Tennessee Polytechnic Institute, Cookeville, Tenn.
A4WSC	TH 358 A, Fort Bragg, N. C.
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A5NFL	Louie N. Peterson, Jr., 310 North Liberty Street, Canton, Miss.
A5PDM	Kenneth W. Bloom, 1908 Hardy Street, Hattiesburg, Miss.
A5PPB	George E. Corkren, W. C. B. I., Columbus, Miss.
A5QBM	Malcolm O. Smith, Box 139A, Steens, Miss.
A5RAR	Otto K. Wiesenburg, 529 North Pascagoula, Pascagoula, Miss.
A5WAR	3522 Sig Unit Tng Center, Bldg T-31, Box 6238, Parkway Sta, Jackson Miss.
	William F. Coleman, Sig Det, ASU 3003, Fort McPherson, Ga.
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	Lester D. Fowler, Box 6238, Parkway Sta, Jackson 9, Miss.
	Robert E. Hunt, Stu Co #2, Camp Gordon, Ga.
	Johnce D. Townsend, Sig Det ASU 3003, Fort McPherson, Ga.
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A3LTA	George A. Franco, 213th AAA Gun Battalion, Camp Stewart, Ga.
A3QFK	Henry Tamanini, Hq Btry, 190th FA Group, Camp Rucker, Ala.
A3QXU	Eugene W. Carey, Instr. Co. B, 9600 TSU, STR, Camp Gordon, Ga.
A5QJR	Robert T. Hart, Stu Co #3, STR, Camp Gordon, Ga.
A5RME	Robert G. Kuykendall, Co 10, STR, Camp Gordon, Ga.
AØBVJ	Stanley C. Papoutsis, Instr Co B, Camp Gordon, Ga.
AØBVI	Stanley A. Opsahl, Instr Co "B," STR, Camp Gordon, Ga.
AØDFG	Ervin R. Schwerdtferger, 990 Sig Ooperations Co, Camp Gordon, Ga.

FOURTH ARMY

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A5ALL	Burnett M. Frazer, 425 West Erwin Street, Tyler, Tex.
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A5CBP	Dennis J. Ahern, 355 Sig Radar Maint Unit, Fort Bliss, Tex.
A5CVW	William F. Bonnell, 3820 Hamilton Drive, Fort Worth, Tex.
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A5DG	Russel E. Curry, 2121 NW 34th Street, Oklahoma City, Okla.
A5DJB	David W. Young, Jr., 206 Elizabeth Road, San Antonio, Tex.
A5DRO	Grant W. Moore, Rt #11, Box 126, San Antonio, Tex.
A5DSE	Victor H. Cobb, 604 West 4th, Hope, Ark.

A5DYF	Arthur L. Smith, Jr., 410 East Jefferson, Siloam Springs, Ark.
A5EIR	Cecil M. Polvado, 1116 North King, Alice, Tex.
A5ERM	E. Ray Long, 2440 West Eubanks, Oklahoma City, Okla.
A5EV	Graham W. Fuller, Corner Dean and Lincoln Streets, Marfa, Tex.
A5EZD	Lotus B. Blackwell, 2432 27th Street, Lubbock, Tex.
A5FBH	MARS Director, Killeen Base, Tex.
A5FCP	Robert W. Jackson, Post Signal Office, Fort Sill, Okla.
A5FME	Lowell J. Mahaffey, RR #2, Fairmont, Okla.
A5FOG	Clarence E. Scott, Star Route, Lawton, Okla.
A5FOM	James E. Holley, Bldg 900, Fort Sill, Okla.
A5FRP	John H. Sampson, Qrs 1306, 13th Loop, Albuquerque, New Mex.
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A5GII	Richard D. Hall, 224 East "D," North Little Rock, Ark.
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A5NRK	Merwin B. Forbes, Armed Forces Sp Wpn Proj., Sandia Base, N. Mex.
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A5KQZ	Guy R. Reed, Jr., 4416 Polk, Houston, Tex.
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A5LEF	Willie E. Petty, 111 S. W. U., Sandia Base, Albuquerque, N. Mex.
A5LEH	Robert H. Rudasill, 3615 NE 21st Street, Amarillo, Tex.
A5LEX	James W. Raburn, 428 Elm, Norman, Okla.
A5LFG	J. George Loos, Jr., Apt. 6, Municipal Airport, Laredo, Tex.
A5LGI	Boss Fries, Jr., Hq & Hq Co 1st Bn, 279th Inf, Camp Polk, La.
A5LHI	John H. Dunlavy, Jr., 711 Mason Street, San Antonio, Tex.
A5LHQ	Charles B. Childress, 611 West Mary Street, Austin, Tex.
A5LIU	Herbert B. Spoonts, 325 Sneed Hall, Texas Tech, Lubbock, Tex.
A5LKM	Barry D. Bynum, 2801 Avenue "M," Snyder, Tex.
A5LNG	Jack O. Wilson, 1708 12th Street, Los Alamos, N. Mex.
A5LOK	Vernon L. Kimball, Jr., 3708 West 11th Street, Little Rock, Ark.
A5LOT	Robert S. Johnson, Qrs 1024–B, Fort Bliss, Tex.
A5LSE	Edward Hale, 2292 Jean Street, Houston, Tex.
A5LXK	Harold L. Sunderland, Army Field Forces, Bldg #4, Fort Bliss, Tex.
A5LZJ	Joseph F. Bollinger, 211 West Sypert, Nashville, Ark.
A5MDA	Samuel P. Wright, 4052d ASU, Fort Bliss, Tex.
A5MDG	Garry Owen, 3231 Memphis Street, El Paso, Tex.
A5MF	Lee J. Keith, 427 John Adams Drive, San Antonio, Tex.
A5MFO	Henderson H. Rogers, Jr., Rt #1, Arkadelphia, Ark.
A5MK	Robert Z. Glass, 4701 Linden Street, Bellaire, Tex.
A5MKF	William Meador, 8460th Sp Wpn Gp, Albuquerque, N. Mex.
A5MLZ	James W. Bristow, 6602 Linden, Houston, Tex.
A5MM	Bob E. Tripp, 4818 Manett, Dallas, Tex.
A5MOV	James C. Thornton, 4401½ San Jacinto, Dallas, Tex.
A5MPV	Ernest G. Basinger, 927 South Lahoma, Norman, Okla.
A5MRA	Joe H. Miller, Route 2, El Campo, Tex.
A5MSH	Richard W. Whitsitt, 1806 South Main Street, Jonesboro, Ark.
A5MUP	Ray Sparks Caldwell, 2021 Rose Street, Lake Charles, La.
A5MYA	Bernard V. Roberts, 602 West Kelly Street, Silver City, N. Mex.
A5OJ	Joseph D. Jones, Jr., 712 North 13th Street, Frederick, Okla.
A5OJU	William L. Burton, 421 North Reynolds, Alice, Tex.
A5OKC	Edgar A. DeWalt, AA & GM Br TAS, Fort Bliss, Tex.
A5OML	Richard Wilson, 8470th Tech Training Group, Sandia Base, N. Mex.
A5OND	Vernon C. Atwood, Jr., Belleview Road, Plaquemine, La.
A5ONZ	Robert W. Haisty, 1321 Wilson, Arkadelphia, Ark.
A5OOW	Fred Carter, 2702 E. Newton Court, Tulsa, Okla.
A5OQD	Gilbert L. Butler, 1212 Gore Avenue, Lawton, Okla.
A5ORE	Fred H. Morgan, 2009 NE 21st Street, Oklahoma City, Okla.
A5ORO	Robert R. Hathaway, 910 Roberts Street, El Campo, Tex.
A5OSG	Pepos S. Dounson, 910 West Mistletoe Avenue, San Antonio, Tex.
A5OSZ	Fletcher S. Randall, 711 Williams Avenue, Cleburne, Tex.
A5OUG	Tilton R. Oakley, 330 Bobb Street, Houston, Tex.
A5OVT	Edward M. Hale, 501 Walker Street, Houston, Tex.
A5OVV	Albert E. Heine, 3236 Canonicus, Baton Rouge, La.
A5OZI	Llewellyn P. Rose, 2206 Parkway, Austin, Tex.
A5PCS	Ralph G. Close, Jr., 3084 38th Place, Sandia Base, Albuquerque, N. Mex.
A5PDK	Robert L. Mayhercy, Qrs 1065B, Fort Bliss, Tex.
A5PFQ	Edward G. Barry, Jr., 1223 8th Street, Arkadelphia, Ark.
A5PGA	Earl N. Sisk, Jr. 2817 Emrich Street, Fort Smith, Ark.
A5PGP	William Osteyee, AA & GM Br, TAS, Fort Bliss, Tex.
A5PGX	Harley S. Baird, 4 Miami, Vet Village, Stillwater, Okla.
A5PJU	Lawrence R. DeRusha, 908 North Canal Street, Carlsbad, N. Mex.
A5PKS	James W. Russell, Hq 41st Armd Inf Bn, Camp Hood, Tex.
A5PML	Cecil C. Cash, c/o Post Signal Office, Fort Sill, Okla.
A5PNX	Norman A. Charette, Qrs 4480, Fort Sill, Okla.
A5PPF	Frederick C. Stanford, AA & GM Br, TAS, Fort Bliss, Tex.
A5PPN	Elmer E. Jameson, Jr., Potash Co of America, Mine Site Box 31, Carlsbad, N. Mex.
A5PQF	Willard Flint, Okla A & M College, Stillwater, Okla.
A5PVF	J. Frank Brumbaugh, 48 South Toledo Avenue, Tulsa, Okla.
A5PVW	Jack M. Ashford, 101 North Montclair, Dallas, Tex.
A5PWV	Warren S. Quinn, 384B Deep Eddie Apts, Lake Austin Boulevard, Austin, Tex.
A5PYC	Oscar C. Wilks, Jr., Hq Co 2d Armd Div, Camp Hood, Tex.
A5PZS	Samuel D. Salt, 1604 West Louisiana, Midland, Tex.
A5PZX	Calvin G. Finley, Dorm 4, Box 353, Texas Tech, Lubbock, Tex.
A5QAF	Woodrow A. Jones, Qrs 553D, Fort Bliss, Tex.

A5QAH	John E. Kelley, #8 Greer Street, Veterans Village, Stillwater, Okla.
A5QB	James E. McGraw, 7964 San Jose Road, El Paso, Tex.
A5QBC	Albert E. Duran, 1600 Fortview Road, Austin, Tex.
A5QBY	John A. Lockerd, Room 320, West Hall, Texas Tech, Lubbock, Tex.
A5QCT	Frederick F. Quist, P. O. Box 1105, Fort Bliss, Tex.
A5QDD	Floyd C. Colyar, 513 East 10th Street, Lordsburg, N. Mex.
A5QDQ	Cleveland P. Huggins, Qrs 5623, Fort Bliss, Tex.
A5QEY	John D. Daly, 908 Front Street, Orange, Tex.
A5QGD	Harvey G. Cross, 909 Alamo Court, Temple, Tex.
A5QGU	Leonard N. Pattillo, 1019 East 25th Street, Houston, Tex.
A5QGX	Floyd C. Ducote, 3132 Maryland Court, Alexandria, La.
A5QHJ	William C. Gann, Rt #2, Box 258, El Paso, Tex.
A5QIN	Howard L. Scott, P. O. Box 1231, Alexandria, La.
A5QJN	Howard H. Cole, 1232 North Stanford, Albuquerque, N. Mex.
A5QLG	James E. Pipkin, 9361st TSU, Red River Arsenal, Tex.
A5QLO	Sven A. Bach, 479 Wheaton Road, San Antonio, Tex.
A5QNL	Clarence E. McCardie, Red River Arsenal, Texarkana, Tex.
A5QOT	Albert A. Watts, 142d Armd Sig Co, 2d Armd Div, Fort Hood, Tex.
A5QPR	Harry E. Lindie, Sunrise Acres, El Paso, Tex.
A5QQT	Neil C. Keith, 3604 Jefferson Street, El Paso, Tex.
A5QVE	Carl H. Hatch, 474 Wheaton Road, Fort Sam Houston, Tex.
A5QWB	August J. Sabel, Qrs 4230, White Sands Proving Ground, Las Cruces, N. Mex.
A5QWE	Benjamin I. Hill, Qrs 552D, Fort Bliss, Tex.
A5QWK	James F. Pa, 806 Palo Duro, Amarillo, Tex.
A5QXK	Sterling M. Rodgers, 335 West Hall, Texas Tech College, Lubbock, Tex.
A5QZA	Lyle E. Daggett, Qrs 345, Fort Bliss, Tex.
A5QZL	William N. Gurnee, Qrs 1019D, Fort Bliss, Tex.
A5RAF	Robert C. Northrup, 118 Hope Avenue, Victory Circle, Fort Bliss, Tex.
A5RAJ	Bruce L. Dillinger, 4054 ASU Enl Stu Det, AA & GM Br, TAS, Fort Bliss, Tex.
A5RAL	Roy R. Bernhard, 446 Brees Boulevard, San Antonio 9, Tex.
A5RCL	Robert T. Miner, 509 East 16th Street, Houston, Tex.
A5REW	J. W. Jones, 2111 East Maine Street, Enid, Okla.
A5RFD	Alden F. Wooster, 2538 East Oklahoma Street, Tulsa, Okla.
A5RIT	Richard L. Hoyt, 1318 Andrews, Lawton, Okla.
A5RJE	John L. Armstrong, 8405 Bower Road, El Paso, Tex.
A5RJR	Hamilton W. Zirjacks, Qrs AA–34, Red River Arsenal, Texarkana, Tex.
A5RKF	Hicklin A. Harrel, Jr., 1546 Lombardy, Apt. 1, Houston 3, Tex.
A5RLH	John J. Phoenix, Hq Btry, 62d AAA AW Bn (SP), Camp Hood, Tex.
A5RNT	Corwin Q. Wadsworth, Qrs 4306, White Sands Proving Ground, Las Cruces, N. Mex.
A5RRS	William H. Aderhold, 242 Calgary Avenue, San Antonio, Tex.
A5RWQ	Jesse E. Singleton, 112–B Hood Village, Fort Hood, Tex.
A5RYN	Austin L. Shamblin, 413 North Pearl Street, Belton, Tex.
A5RZB	James S. Brown, 7620 Hacienda Drive, El Paso, Tex.
A5SA	Elmer A. Volzer, 3919 East Smith Avenue, Albuquerque, N. Mex.
A5SBS	Selby B. Harris, 1500 North Main Street, Temple, Tex.
A5SFB	Roland M. Wood, Jr., BOQ 577, Fort Sam Houston, Tex.
A5TV	Andrew E. Crockett, 142 Archimedes Drive, San Antonio, Tex.
A5USA	Headquarters, Fourth Army, Fort Sam Houston, Tex.
A5WAA	Jesse B. Edwards, Jr., 49th Armd Sig Co, Bldg T61, National Guard Area, Love Field, Dallas, Tex.
A5WAB	Second Armored Div, Camp Hood, Tex.
A5WAC	Fort Bliss Amateur Station, Bldg 504–B, Fort Bliss, Tex.
A5WAE	Texas National Guard, Camp Mabry, Austin, Tex.
A5WAF	New Orleans Port of Embarkation, 4400 Dauphine, New Orleans, La.
A5WAG	Signal Co, 39th Inf Div, 1700 Moss Street, New Orleans, La.
A5WAH	Post Signal Office, Fort Sill, Okla.
A5WAI	4517 ASU ROTC, Okla A & M College, Stillwater, Okla.
A5WAK	Operations Platoon, 45th Sig Co, Lincoln Park Armory, Oklahoma City, Okla.
A5WAM	90th Signal Co, Bldg 122, Fort Sam Houston, Tex.
A5WAO	49th Armored Div. Trains, Tng. 14th and Cypress Streets, Orange, Tex.
A5WAP	95th Sig Co, 95th Inf Div, 410 West Noble, Oklahoma City, Okla.
A5WAQ	Red River Arsenal, Texarkana, Tex.
A5WAS	4055 ASU, 1st GM Group, Bldg 2059, Fort Bliss, Tex.

FOURTH ARMY—Continued

A5WAT	4305th ASU Texas Tech ROTC, Lubbock, Tex.
A5WAY	Hq, Louisiana NG, Jackson Barracks, New Orleans, La.
A5WPS	Walter F. Molesky, custodian, Qrs 1324, Sandia Base, Albuquerque, N. Mex.
A5WSP	White Sands Proving Ground, MARS Radio Station, Las Cruces, N. Mex.
A5WW	William W. Adams, Signal Section, Hq 4th Army, Fort Sam Houston, Tex.
A5YCS	Junious Marion Turley, 402 Elm Street, Stillwater, Okla.
A5ZAB	Joseph A. Pullen, 819 East Main Street, Houma, La.
A5ZM	New Mexico Military Institute Radio Club, Roswell, N. Mex.
A5ZU	George M. Sayre, 1621 North Kansas Avenue, Roswell, N. Mex.
	Charles Victor DeLerno, 1736 Audubon Street, New Orleans, La.
A1PFG	Joseph W. Crawford, 4017 Oxford, El Paso, Tex.
A7HUI	Clarence F. Craw, 3119 Tularosa Street, El Paso, Tex.

FIFTH ARMY

A7GZI	William C. Garbutt, Box 567, Greybull, Wyo.
A7IAP	John F. Waddell, 624 Emerson Street, Sheridan, Wyo.
A7JDB	Lawrence L. Daily, 1205 Lewis, Laramie, Wyo.
A7JJO	Carl E. Dierks, 1005 Culbertson Avenue, Worland, Wyo.
A7JMM	Donald G. Huffaker, 148 West Burrows, Sheridan, Wyo.
A7LLP	Walter A. Crook, 315 Huntington Avenue, Box 594, Sheridan, Wyo.
A7MUG	Robert E. Williams, 1322 Court Place, Rawlins, Wyo.
A7NJF	Donald E. Jones, 649 Burton Street, Sheridan, Wyo.
A7WAN	Hq and Hq Btry, 300th Armd FA Bn, Wyoming NG, 337 North Jefferson Street, Sheridan, Wyo.
A8BSZ	Joseph M. Malik, 706 North Monroe, Monroe, Mich.
A8BUZ	46th Signal Co, Michigan NG, 1025 South Huron Street, P. O. Box 292, Ypsilanti, Mich (Harry T. Croell, Custodian).
A8CBH	William A. Gerber, 1002 Stephenson Avenue, Menominee, Mich.
A8CBM	Ernest B. Blett, 19176 Forrer, Detroit 35, Mich.
A8DKQ	Stanley P. Smith, 594 East Grand Boulevard, Ypsilanti, Mich.
A8DSE	Hugh E. Gibson, 1547 South Brooks Road, Muskegon, Mich.
A8EFH	Clarence C. Feightner, 2742 Hermansau, Saginaw, Mich.
A8EXZ	James O. Pullman, 834 Edison Avenue, Detroit 2, Mich.
A8FHP	Lawrence Everett Silverton, 1120 Southwick Court, Willow Run, Mich.
A8FSO	Theodore Pearce, 207 Blanche Street, Houghton, Mich.
A8FTW	Michael Zunich, 13441 Reynolds, Detroit, Mich.
A8HFS	Jay C. Jennings, 1141 Farrand Street, Lansing, Mich.
A8IIA	Harry C. Lewis, 20375 Hubbard Avenue, Farmington, Mich.
A8LHB	Michael S. Obershea, 1217 Putnam, Detroit, Mich.
A8NOF	Royal D. Hillier, 14250 Ardmore, Detroit 27, Mich.
A8RTN	Addis L. Tippett, 1302 Stocker Avenue, Flint, Mich.
A8SHX	Theodore Friedman, 1954 Blaine, Detroit, Mich.
A8SWA	Leonard F. Geenen, 1090 Columbia Road, Berkley, Mich.
A8SWG	Arthur G. Bauernfeind, 563 North Clark Street, Niles, Mich.
A8TZC	William P. Boss, 18630 Dix Road, Melvindale, Mich.
A8TZE	Ovide M. Lee, 301 Miller Street, Alpena, Mich.
A8USA	425th Inf Regt, Michigan NG, 285 Piquette Avenue, Detroit, Mich.
A8VCX	Roger W. Reed, 540 Riverview, Ann Arbor, Mich.
A8WAD	5244th Sig Svc Gp (Tng), 223 East Ann Street, Ann Arbor, Mich.
A8WAF	5241st Sig Svc Gp, 6301 West Jefferson, Detroit 17, Mich.
A8WAG	838th Signal Radio Relay Co, Bldg 90, 6301 West Jefferson, Detroit 17, Mich.
A9WAM	Hq 46th Infantry Division Artillery, 15000 West Eight Mile Road, Detroit 35, Mich.
A8WAN	5170th Sig Light Const Bn, 121 Manchester SW., Grand Rapids, Mich. (Morley R. Wilson, Custodian).
A8WAR	Hq 22d AAA Group, Building 2340, Fort Custer, Mich.
A8WAV	Michigan ORC Instructor Group, 5106 ASU, Flint Sub-Station, 432 North Saginaw Street, Flint, Mich.
A8WAW	5567th OR Research and Development, Unit (U. S. Army), 1700 College Avenue, Houghton, Mich.
A8WHO	Robert H. Stevens, 14634 Warwick Road, Detroit 23, Mich.
A8YCT	Harry A. Albright, 10557 Auburn Road, Utica, Mich.
A8YPD	Theo W. Williams, 105 Elm Street, Ypsilanti, Mich.
A8ZUY	Henry A. Blum, 19326 Hershey, Detroit, Mich.
A8ZYD	Virgil R. Owens, 702 Lawson, Royal Oak, Mich.

A9ABD	5403 ASU, ROTC Det, 716 Langdon Street, Madison, Wis. (J. V. Nicholas, trustee).
A9ARX	James A. Reynolds, 318 North Walnut, Danville, Ill.
A9ATP	Francis I. McPike, 3305 East St. Clair Street, Indianapolis, Ind.
A9AZJ	Robert H. Decker, 311 Read Street, Evansville, Ind.
A9BEW	Glen V. Blakeslee, 649 Summer Street, Eau Claire, Wis.
A9BIN	Charles H. Perdew, 902 Front Street, Henry, Ill.
A9BNF	John A. DeVoss, RFD #1, Farmland, Ind.
A9BSR	John J. Crittenden, 3250 North Downer Avenue, Milwaukee, Wis.
A9CAD	Thomas R. Warner, 715 East Chicago Avenue, Palatine, Ill.
A9CIU	Frederic C. Shidel, Jr., 414 Brewster Avenue, Lombard, Ill.
A9CNH	33d Infantry Division, 1551 North Kedzie Avenue, Chicago, Ill.
A9CQU	William F. Spanke, 254 Cleveland Street, Gary, Ind.
A9CUV	Lawrence J. Lynch, 24 Brittany Lane, Rock Island, Ill.
A9CZB	Fay C. Sweeny, 409 South Horace Avenue, Rockford, Ill.
A9DCM	Webster F. Soules, 1450 Longfellow Avenue, South Bend 15, Ind.
A9DHA	Richard M. King, 317 Barker Avenue, Peoria 5, Ill.
A9DKR	William J. Smiley, 527 West Jackson Street, Kokomo, Ind.
A9DMK	Robert E. Lay, Jr., 2101 California, Columbus, Ind.
A9DNC	Phillip E. Young, 2127 West 3d, Marion, Ind.
A9DQE	Charles L. Waters, 118 Howard, Ripon, Wis.
A9DRU	Alfred C. Weed, Jr., 5311 Dorchester Avenue, Chicago 15, Ill.
A9DYZ	John A. Benz, 4809 West Fond du Lac, Milwaukee, Wis.
A9EMV	Mitchell E. Miller, 203 Randolph Street, Vandalia, Ill.
A9EUE	William D. Ehmann, 3909 Council Crest, Madison, Wis.
A9EWY	Karl L. Olberg, 1810 Loomis Street, La Crosse, Wis.
A9EXY	Donald A. Jensen, 419 Walnut Street, Wooddale, Ill.
A9FAI	Raymond R. Mercer, 5909 West Church Street, Morton Grove, Ill.
A9FAK	Billy V. Gwyn, 210 West 1st Street, Mount Carmel, Ill.
A9FJL	Richard S. Fisher, 906 Franklin Street, Columbus, Ind.
A9FJO	George L. Sensibar, 1333 Birchwood Street, Chicago, Ill.
A9FLE	John H. Zahrt, 302 East Street, La Porte, Ind.
A9FMP	Voyle R. Dawson, 12606 South Lowe Avenue, Chicago 28, Ill.
A9FNC	Roger W. Ponto, 2137 North 64th Street, Wauwatosa, Wis.
A9FQG	John R. Fisher, 58 SW First, Linton, Ind.
A9FSN	Garl E. Danford, DA, Monitoring Station, % Signal Office, Fort Riley, Kans.
A9GAL	Louis F. Kruse, 3028 Western Avenue, Park Forest, Chicago Heights, Ill.
A9GEB	Robert A. Schutte, 926½ North 6th, Quincy, Ill.
A9GHK	Wilfred B. Bahr, 1201 East Blackford Avenue, Evansville, Ind.
A9GHW	Frank C. Ahlgrim, 4642 Middaugh, Downers Grove, Ill.
A9GIO	Robert G. Christianson, Toma Hawk Vocational School, Toma Hawk, Wis.
A9GLR	James G. Card, 609 West Illinois, Urbana, Ill.
A9GQQ	Samuel J. Jamieson, RR #1, Box 363, Granger, Ind.
A9GUK	Thurman Ridgway, 1614 North Wilber Street, South Bend, Ind.
A9GXW	Earnest R. Oney, 6251 Ingleside, Chicago 37, Ill.
A9HAE	Robert D. Pittman, 709 East Pennsylvania, Hoopeston, Ill.
A9HJE	Norman C. Finney, Quarters 15A, Benjamin Harrison Air Force Base, Indianapolis 16, Ind.
A9HME	Donald R. Srenaski, 1505 Olive Road, Homewood, Ill.
A9HTV	Harlan P. Sieth, 1802 North Oneida Street, Appleton, Wis.
A9HZG	Allison McNeill, P. O. Box 127, Martinton, Ill.
A9IDR	James F. Nicholson, 111 Lydia, Peoria, Ill.
A9IGG	Kyle F. Hickam, 208 Halcyon Road, Charlestown, Ind.
A9ILM	Clarence W. Wenzel, 106 East 13th Street, Alton, Ill.
A9IRM	John E. Kremers, 1039 South 112th, West Allis 14, Wis.
A9JGC	John G. Moline, 514 Second Street, Henry, Ill.
A9JGL	Spencer M. Allen, 7522 Ridge Avenue, Chicago, Ill.
A9JJB	Warren O. Weathers, 201 East Lincoln Street, Ogden, Ill.
A9JNL	Albert M. Gust, 1656 Rice Street, Logansport, Ind.
A9JUB	Howard P. Reisdorf, 544 South Virginia Avenue, Belleville, Ill.
A9JUJ	Mildred Ann Coulter, RFD #2, Box 362, Muncie, Ind.
A9KIJ	Edward B. Thornley, Apartment 109, Badger, Wis.
A9KNP	James A. Gundry, 8314 South Langley Avenue, Chicago 19, Ill.
A9KUB	Floyd E. Lynn, 916 North Lewis Avenue, Waukegan, Ill.
A9LBI	Patrick D. Storto, 2853 West Van Buren, Chicago, Ill.
A9LHI	Victor La Rue Holtzinger, Valparaiso Technical Inst., Valparaiso, Ind.
A9LTA	George B. Flenner, RR #1, Pinegate Highlands, Palatine, Ill.

A9LZU	Curtis C. Schultz, 3270 North 8th Street, Milwaukee 6, Wis.
A9MEE	Robert F. Erickson, 342 South Main Avenue, New Richmond, Wis.
A9MFX	Jack L. Seib, Petite Lake, Antioch, Ill.
A9MTG	George J. Patsios, 1421 North Linder Avenue, Chicago, Ill.
A9MWD	Robert H. Perthel, 2366 North 5th Street, Milwaukee, Wis.
A9NYC	Raymond Goss, 3313 Tng Sq, Scott AFB, Ill.
A9NZH	Herman A. Moench, 47 South 15th Street, Terre Haute, Ind.
A9OOP	Paul Miller, 5304 South Dearborn Street, Chicago, Ill.
A9OQY	R. Stephen Bellgraph, 223 Decorah Road, West Bend, Wis.
A9PBL	Ernest R. Arms, 502 Newton Street, Johnston City, Ill.
A9PDS	Arthur R. O'Neil, 1525 North Adams, South Bend, Ind.
A9PLE	Stanley J. Kowalski, 4054 West Oakdale Avenue, Chicago 41, Ill.
A9PMS	Angus E. McDonnell, Box 34, Rothschild, Wis.
A9RAU	Leonard M. MaComber, North and Railroad, Lake Bluff, Ill.
A9RE	Wilber E. Monigan, 1504 East Ewing Street, South Bend 14, Ind.
A9SDP	William L. Holcomb, 308 West Stadium, West Lafayette, Ind.
A9SWN	Louis C. Fahrlender, 2450 North Bedford, Evansville, Ind.
A9TEK	Gerald E. Fenimore, 1408 Glen Arm Road, Indianapolis, Ind.
A9TFY	Harold F. Wirt, Alpha, Ill.
A9TJG	Kenneth R. Fleming, 257 Seventh Street, Fond du Lac, Wis.
A9USA	Headquarters, Fifth Army, Chicago 15, Ill. (Wm. L. Spanke, Custodian).
A9UXR	Marion H. Lawrence, 607 West 8th Street, Johnston City, Ill.
A9VBJ	Roger C. Holloway, 1017½ East 2d Street, Michigan City, Ind.
A9VDI	Louis D. Russell, 420 Maple Street, Mount Vernon, Ill.
A9WAA	5481 ASU ROTC Unit, Purdue University Armory, West Lafayette, Ind. (John Battle Horton, Custodian).
A9WAB	U. S. Army, Chicago Sub Office, ORC Signal Section, Navy Pier, Chicago 11, Ill.
A9WAC	Hq & Hq Co, 1st Bn, 123d Inf, Illinois NG, 109 East Park, Champaign, Ill.
A9WAG	5699th Sig Base Depot Co, ORC, 510 Columbia, Lafayette, Ind.
A9WAH	84th Airborne Signal Co., 215 East Buffalo Street, Milwaukee, Wis.
A9WAI	38th Sig Co, 38th Inf Div, Indiana NG, 2000 Madison Avenue, Indianapolis, Ind.
A9WAJ	Hq, Hq & Svc, 385th Tk Bn, ORC Armory, Wausau, Wis.
A9WAK	320th Sig Bn (Sep), Bldg 6–A, Fort Benjamin Harrison, Ind.
A9WAN	The Rock Island Sub-Office, Det #4, 5252ASU, Bldg #90, Rock Island Arsenal, Rock Island, Ill.
A9WAO	Hq & Hq Det Illinois NG, Illinois NG General Depot, Springfield, Ill.
A9WAP	816th Sig Info & Monitoring Co, 325 West Washington, Waukegan, Ill.
A9WAU	Illinois Military District, ORC Instructor Group, Det #4, 216 East Main Street, Galesburg, Ill.
A9WAY	Co. B, 724th Engr Cmbat Bn, The Armory, Hayward, Wis.
A9WAZ	109th AAA Brigade, 5917 Broadway Avenue, Chicago 40, Ill.
A9WBB	Battery C, 233d FA Bn, ING, 312 South 1st Avenue, Canton, Ill.
A9WIO	James V. Zvolanek, 3747 West 83d Place, Chicago, Ill.
A9WQA	Thomas S. Wonnell, 2045 Allison, Indianapolis, Ind.
A9WRH	George A. Gust, 1140 West Napier, South Bend, Ind.
A9ZBZ	Robert L. Campbell, Jr., RFD #2, Jasper, Ind.
A9ZKB	Paul F. Larsen, 1015 A Washington Street, Apt. 1, Manitowoc, Wis.
A9ZMU	James H. Moore, RFD #2, Hanover, Ill.
A9ZRF	Clifford F. Esmiol, 10510 Calumet Avenue, Chicago 28, Ill.
A9ZRU	Roger C. Kaney, Box 86, Forreston, Ill.
AØAHM	John K. Webb, 2D Moro Court, Manhattan, Kans.
AØAAE	Fort Riley Amateur Radio Club, Bldg #562, Fort Riley, Kans.
AØAJV	James S. Heaton, 800 Mississippi Street, Lawrence, Kans.
AØAK	Charles M. Orcutt, Congregational Parsonage, Anita, Iowa.
AØAKF	Hilmar J. Schmidt, RFD #4, Cedar Falls, Iowa.
AØANS	Meredith S. Ulstad, Madison, Minn.
AØAOD	Dale E. Cooper, 1413 Elmwood Street, Lawrence, Kans.
AØARJ	Elmer A. Brickman, 4120 Lakewood Avenue, White Bear Lake, Minn.
AØASO	Charles L. Hansen, 3552 Pacific Street, Omaha, Nebr.
AØBJG	Charles E. Hobbis, 1202 2d Avenue South, Fargo, N. Dak.
AØBKQ	Raymond E. Johnson, RFD #2, Annandale, Minn.
AØBNE	Melvin W. Woerz, 5637 Enright Avenue, St. Louis, Mo.
AØBPC	Wilson W. Van Winkle, 1200 Walnut Street, Chillicothe, Mo.
AØBPX	Ralph J. Wilkins, 4163 Hertling Place, St. Louis, Mo.
AØBQM	John E. Mitchell, Jr., 8521 South Broadway, St. Louis, Mo.

AØBSC	Donald P. N. Rosley, 1203 2d Avenue, South Fargo, N. Dak.
AØBSK	Eugene E. Heck, 3638 East 8th, Des Moines, Iowa.
AØBTN	Merritt M. Yancey, 810 Beck Street, Charles City, Iowa.
AØBVL	James S. Malsbary, 280 Edwin Avenue, St. Louis, Mo.
AØCRZ	Harland S. Laycock, 844 Pammel Court, Ames, Iowa.
AØDEK	Graham E. Smith, 15 Bellaire Avenue, White Bear, Minn.
AØDFY	Warren T. Lackie, 3421 Humbolt Avenue, South, Minneapolis, Minn.
AØDSF	5441 ASU ROTC Det, University of Minnesota, 17th and University SE., Minneapolis, Minn.
AØEAO	James D. Fry, 2619 North 67th Street, Omaha, Nebraska.
AØEBH	Harry E. Schuster, Klemme, Iowa.
AØEJP	Charles C. Orme, 4232 London Road, Duluth, Minn.
AØELL	Edward C. Gessert, Jr., 2045 Rosemary, Denver, Colo.
AØEML	Rex G. Sebring, 602 North Poplar, Wichita, Kans.
AØENT	Richard L. Hatcher, 4 West Forest Street, Lee's Summit, Mo.
AØETK	Leland A. Capehart, 6916 South Grand Boulevard, St. Louis, Mo.
AØETX	Harold D. Howard, Hq & Hq Svc Co, 439 Engineer Const Bn, Camp Carson, Colo.
AØFRJ	Joseph E. Martin, 1038 East National Boulevard, Springfield, Mo.
AØGBZ	Clarence J. Hartneck, Lakefield, Minn.
AØGFH	Edward W. Kruse, 3920 North 37th Street, Omaha, Nebr.
AØGGR	Theodore M. Thorson, 1018 River Avenue, Bismarck, N. Dak.
AØGHE	Guy M. Chilson, 1501 2d Avenue, Leavenworth, Kans.
AØGMJ	Riley K. McGinness, Belvidere, Nebr.
AØGOT	Robert W. Arant, 6407 Blondo, Omaha, Nebr.
AØGVB	Paul E. Chaney, 415 North Main, Fredericktown, Mo.
AØHFN	Arlen J. Zimmerman, 26 9th Street North, Fargo, N. Dak.
AØHIV	Anton Aman, 118 9th Street South, Fargo, N. Dak.
AØHQA	Ralph E. Pixley, 744 38th Street, Des Moines, Iowa.
AØHSO	John McKinney, Jr., 2023 West 12th Street, Grand Island, Nebr.
AØIA	Eugene M. Link, 1420 Fourth Avenue, Boulder, Colo.
AØICH	34th Signal Company, Iowa NG, 1915 Prospect Road, Des Moines, Iowa.
AØIGA	Robert F. Gellerman, 518 Prospect Avenue, Cloquet, Minn.
AØIGL	William C. Schroeder, 2103 West 2d Street, Davenport, Iowa.
AØIQC	Robert A. Atkeisson, RFD #9, Kansas City 3, Mo.
AØIZJ	Ralph L. Eaton, 18th & Rural, Emporia, Kans.
AØJLL	James V. Scott, 413 East Avenue A, Hutchinson, Kans.
AØJPW	Robert M. Hart, 709 1st Street, Bismarck, N. Dak.
AØJZA	William W. Phillips, Box 153, Doniphan, Mo.
AØKEV	Akira Kometsu, 1235 Farrington Avenue, St. Paul, Minn.
AØKKS	Eugene P. Spaulding, Natoma, Kans.
AØKNB	Joseph W. Jones, 2527 Avenue East, Council Bluffs, Iowa.
AØKSY	Philip W. Smyth, 2145 Maryland Avenue, Topeka, Kans.
AØKUP	Samuel R. McConoughey, 1078 Pammel Court, Ames, Iowa.
AØLET	Edwin Seitz, 806 1st Street, Bismarck, N. Dak.
AØLHS	William D. Snyder, 205 South 14th Street, Fargo, N. Dak.
AØLHT	John C. Orthel, 5525 Upton Avenue, South, Minneapolis 10, Minn.
AØLKK	Charles E. Pallas, 2228 Lincoln Way, Ames, Iowa.
AØLPU	Melvin L. Andrew, RFD, Brownville, Nebr.
AØMFT	Kermith W. Trimble, 1521 Stevens, Parsons, Kans.
AØMID	Fred S. Jones, 405 Sunflower Road, Sunflower, Kans.
AØNI	State Hq & Hq Det, Kansas NG, 28th and Topeka Boulevard, Topeka, Kans.
AØNQG	Wayne F. Samuelson, 516 West 15th, Hays, Kans.
AØNVP	Edward J. Hayes, 421 9th Street, Bismarck, N. Dak.
AØOQK	Richard W. Shaw, 3802 Askew, Kansas City, Mo.
AØOUC	Donald E. Mehl, 8001 Pacific Street, Omaha, Nebr.
AØOZN	William J. Schmidt, 306 South Vassar, Wichita, Kans.
AØPCV	Morton H. Jensen, 1547 Hewitt, St. Paul, Minn.
AØQHT	Victor L. Felix, 654 Lincoln Street NE., Minneapolis, Minn.
AØRYC	Henry Ruppert, c/o Ft. Riley Amateur Rad Club, Bldg 562, Fort Riley, Kans.
AØSBV	Frank J. Bukacek, 824 F Avenue NW., Cedar Rapids, Iowa.
AØSCM	Jay K. Spalti, 5827 Miami Street, Omaha, Nebr.
AØSGJ	Richard Allen Key, 401 South 10th Street, Bismarck, N. Dak.
AØSKA	Jack B. Harvey, Tarkio, Mo.
AØSUI	Vern M. Buttenob, Howard, S. Dak.
AØSZA	John O. Koehn, Munich, N. Dak.

FIFTH ARMY—Continued

AØSZZ	Wayne A. Holzer, 729 North 5th Street, Montevideo, Minn.
AØTBE	Alfred J. Lompe, 616 Allen, Waterloo, Iowa.
AØTLG	Wendell D. Wilson, 315 South 4th Street, Sterling, Kans.
AØTQZ	Paul E. Richardson, 517 Scott, Monett, Mo.
AØTUH	George M. Park, Jr., 406 North 2d Street, Atchison, Kans.
AØUJE	Max E. Norman, Box 382, Station A, Ames, Iowa.
AØUMH	Edwin Junkert, Wishek, N. Dak.
AØUVM	William R. Ford, 513 North 16th Street, Manhattan, Kans.
AØVIY	Kenneth T. Deutsch, 2640 Magnolia Street, Denver, Colo.
AØVKP	Everett E. Hill, 406 8th Street, South, Fargo, N. Dak.
AØVOI	Dean W. Barker, 621 Central Avenue, Auburn, Nebr.
AØVQW	John D. Mitchell, OBC #1, Bldg 89, Fort Riley, Kans.
AØWAD	5432 ASU, ROTC Det, Iowa State College, Ames, Iowa.
AØWAE	990th Sig Opn Co, 802 Delaware, Kansas City, Mo.
AØWAF	5096th PCS Com (Tng), ORC, 5th Armory, 3800 York Street, Denver, Colo. (Bernard N. Jacobs, Custodian).
AØWAG	35th Sig Co, Missouri NG, The Armory, Chillicothe, Mo.
AØWAH	Hq & Hq Btry, 829th FA GP, Observation Floor, North Dakota State Capitol Bldg, Bismarck, N. Dak.
AØWAI	5607 Signal Training Unit, 620 Front Street, Fargo, N. Dak.
AØWAJ	814th Signal Operations Co., 21st & Woolworth Avenue, Omaha, Nebr.
AØWAK	Service Battery, 147th FA Bn, South Dakota NG, Howard, S. Dak.
AØWAL	5433 ASU ROTC Det, Kansas State College, Manhattan, Kans.
AØWAN	404th Sig T & T Opn Co, ORC Armory, 613 Lafayette Street, Waterloo, Iowa.
AØWAQ	89th Division Signal Company, 626 East Douglas, Wichita, Kans.
AØWAU	977 Signal Fixed Radio Co, 4100 Forest Park Boulevard, St. Louis, Mo.
AØWAV	Heavy Tank 140th Infantry, Missouri NG, 213 East Main Street, Fredericktown, Mo.
AØWBZ	William C. Ward, Ferguson, Mo.
AØWCC	William D. Kanning, Route 1, Audubon, Iowa.
AØWNV	Herman J. Bahr, 18 Summitcrest, Kansas City, Kans.
AØYOV	Craig K. Fullerton, 504 South Leebrick, Burlington, Iowa.
AØYXG	Charles L. Holden, Jr., 1017 North Green Street, Wichita, Kans.
AØYZL	George A. Schwartz, 1339 North Green Street, Wichita, Kans.
AØZAX	Clarence A. Quigley, 1922 Williams Street, Great Bend, Kans.
AØZKO	Charles R. O'Harra, 919 Lincoln, Neodesha, Kans.
AØZSX	Merrill E. Chesebrough, Box E, LeRoy, Minn.
AØZXW	Lawrence R. Thielen, 817 8th Avenue, Brookings, S. Dak.
AØZYJ	Charles P. Hugunin, 1822 West St. Joe Street, Rapid City, S. C.
A3NNU	Kenneth H. Ball, 3325 South Santa Fe Drive, Englewood, Colo.
A5EBL	James T. Hall, Jr., 706 Lake Avenue, Colorado Springs, Colo.
A5RDT	Russel D. Graham, 15th and B Street, Bldg 1148, Camp Carson, Colo.
A8UUS	Melvin G. Marsley, 2238 Stevens Avenue, Kalamazoo, Mich.
A8YOH	Jack R. Chichester, 15378 Santa Rosa Drive, Detroit 21, Mich.
A9AGS	Ronald E. Crebo, Hq & Hq Co, 403d Engr Base Depot, Fort Leonard Wood, Mo.
A9AZR	George A. Cummings, Shady Hill Sub Division, Barrington, Ill.
A9BKJ	George H. Graue, 824 Home Avenue, Fort Wayne 6, Ind.
A9DOQ	Fred W. Kinsey, 8019 South Dorchester Avenue, Chicago 19, Ill.
A9FFV	William A. Markland, 66 Tebbs Avenue, Lawrenceburg, Ind.
A9FSA	George P. Kasdorf, RFD #3, Goshen, Ind.
A9GDH	Charles H. Bowen, 8031 South Dorchester Avenue, Chicago 19, Ill.
A9LTR	Calvin J. Evans, 327 West Spring, LaGrange, Ind.
A9VNV	Charles E. Mitten, 842 North Grant Avenue, Indianapolis 1, Ind.
A9WAS	Office of the Unit Instr, ORC, 807 Maine Street, Quincy, Ill.
AØAGG	William B. Porter, 805 5th Avenue, Windom, Minn.
AØBPB	Alvin L. Harris, 6504 Bedford Avenue, Omaha, Nebr.
AØCEM	John R. Stanesic, 2718 Chandler Road, Omaha, Nebr.
AØDXC	Ernest R. Benham, 910 2d Street NE., Mandam, N. Dak.

SIXTH ARMY

A6AAQ	Donald K. Johnson, 15795 Via Arroyo, San Lorenzo, Calif.
A6AJX	Joe C. Fannin, 511 Galway Place, Fletcher Hills, Calif.
A5AOL	Ernest Barat, Two Rock Ranch Station, Petaluma, Calif.
A6AUQ	Ray W. Hitchcock, 414–A Hornet Street, China Lake, Calif.
A6AYN	Samuel M. Parmelee, 736 Olympic Street, Vallejo, Calif.
A6AZ	Anthony E. Welzel, 700 Ohio Avenue, Apartment 1A, Richmond, Calif.

A6BAF	Harold E. Spaulding, Jr., 4729 Gundry, Long Beach, Calif.
A6BBT	Albert N. Baxter, Jr. 1337 South Valencia, Los Angeles, Calif.
A6BCV	Charles P. Weber, 1032 Beryl Street, San Diego 9, Calif.
A6BHI	Norman Williams, 2925 Bristol Avenue, Stockton, Calif.
A6BKU	Arthur D. Hendricks, 208 East Figueroa, Santa Barbara, Calif.
A6BMX	Earl P. Olsen 142 B Street, Port Hueneme, Calif.
A6BNO	Leonard J. Sluyter, 1887 North Avenue 52, Los Angeles, Calif.
A6BSJ	Richard W. Keusink, 6230th Reception Center, Fort Ord, Calif.
A6CFH	Clifford C. Hampton, 17010 Foothill Boulevard, Hayward, Calif.
A6CJW	Edmund Wong, 1162 Jackson Avenue, San Francisco, Calif.
A6CK	Forrest I. Phippeny, 4344 Greenbrier Road, Long Beach 8, Calif.
A6CNS	Irwin C. Stoll, 1333 West Highland Avenue, Redlands, Calif.
A6CTM	LeVaughn R. Lockwood, Rt #1, Box 635, Tulare, Calif.
A6DIE	Richard P. Hinz, c/o Radio Station KKIN, 821 Rinaldi Street, Visalia, Calif.
A6DIZ	Harold B. Wootton, 5122 West 121st Street, Hawthorne, Calif.
A6DOX	Donald A. Mann, Rt #1, Box 578A, Grass Valley, Calif.
A6DPK	James H. Barton 1916 Octavia Street, San Francisco 9, Calif.
A6DSD	Howard H. Campbell, 2313 Edwards Avenue, Bakersfield, Calif.
A6DZB	William P. Fritz, 17446 Tiara Street, Encino, Calif.
A6EBQ	Donald M. Detrick, Qrs 827D, Fort Barry, Calif.
A6EDG	Robert W. Jones, 78 Tullibee Street, Vallejo, Calif.
A6EGC	Clair McLaughlin, 1227 Spring Street, Paso Robles, Calif.
A6EHJ	Edwin A. Houser, 821½ South Kenmore Avenue, Los Angeles 5, Calif.
A6EIA	Lloyd C. Stepleton, 205th Signal Repair Co., Fort Lewis, Wash.
A6FDT	Robert J. Fell, Laguna Drive, La Honda, Calif.
A6FFJ	Everett G. Reed, 241 North Cordova, Burbank, Calif.
A6FKX	William R. Nodder, 622 Valle Vista Avenue, Oakland, Calif.
A6FMD	Joseph M. Hughes, 1251 Masonic Avenue, San Francisco, Calif.
A6FPR	John A. Downey, 17 Bay View Terrace, Mill Valley, Calif.
A6FQE	Thomas D. Razovich, 642 10th Avenue, San Francisco, Calif.
A6FRE	Joseph F. Struneski, 401–A Washington Boulevard, Presidio of San Francisco, Calif.
A6FXQ	Walter G. Johnson, Rt #1, 486–B, Petaluma, Calif.
A6GBD	John L. Cameron, 1544 Madrono Avenue, Palo Alto, Calif.
A6GCB	James W. McGorray, 206 Putnam, San Francisco, Calif.
A6GDV	Edward Richmond, 13–C Marine View Terrace, Eureka, Calif.
A6GJF	Donald C. Gaubatz, Box 456, Edgewood, Calif.
A6GJU	Jim B. McDaniel, 10110 East Rio Hondo Parkway, El Monte, Calif.
A6GMX	Elwood R. Horwinski, P. O. Box K, Tahoe Valley, Calif.
A6GSR	Frank K. Inami, 802 Washington Avenue, Madera, Calif.
A6GT	Robert E. Kearney, 3650 Tuller Avenue, Los Angeles, Calif.
A6HCW	John A. Pulliams, Jr., 529 West 42d Place, Los Angeles 37, Calif.
A6HGP	Robert C. Menking, 660 Katherine Drive, Montebello, Calif.
A6HHT	Jay F. Helms, 542 Santa Clara Avenue, Alameda, Calif.
A6HJI	William D. McDonald, 3652 Primrose Avenue, Santa Rosa, Calif.
A6HNS	Harry Z. Kaklilikian, 593d Sig Opn Co. Fort Lewis, Wash.
A6HQ	Joseph T. Bindner, 986 Del Rosa Avenue, San Bernardino, Calif.
A6HRQ	Alfred H. Johnson, 4188 Bennett Valley Road, Santa Rosa, Calif.
A6HVE	Durward M. Moore, 2d Sig Det, 2d Sig Bn, Two Rock Ranch Station, Petaluma, Calif.
A6HWQ	Dana V. Clark, Jr., Hq & Hq Btry, 271 AAA AW Bn, Fort Funston, San Francisco, Calif.
A6HWU	Clifford C. Stratton, U. S. C. G. Light Sta, Yerba Buena Island, San Francisco, Calif.
A6HXQ	Clarence Roen, Bldg. 35, Presidio of San Francisco, Calif.
A6HZQ	William R. Mattison, 726 Liberty Avenue, El Cerrito, Calif.
A6IGN	William G. McCracken, 2241 85th Avenue, Oakland, Calif.
A6IKZ	Thaddeus M. Bulkeley, 2425 Third Street, Bakersfield, Calif.
A6ILI	Andrew C. Dapprich, 1961 Ivy Lane, Palo Alto, Calif.
A6IOF	Harrison Breaux, 956 54th Street, Oakland, Calif.
A6IQC	Edward J. Tolosko, 1336 Emeric Avenue, San Pablo, Calif.
A6IQH	James H. Allen, 3350 Holly Drive, Sacramento 16, Calif.
A6IW	Herbert D. Twitchell, 1260 Largo Vista Drive, Beverly Hills, Los Angeles, Calif.
A6JIG	Christian M. Schrotke, 28–3 K Street, 11–C Camp, Taft, Calif.
A6JNC	Francis J. Cole, 1474 20th Avenue, San Francisco, Calif.
A6JVG	Robert F. Franklin, 711 Maddux Drive, Colma 25, Calif.

A6KKH	George Navarre, Qrs #606B, Fort Baker, Calif.
A6KRD	John W. Sherman, Jr., Rt #1, Box 82, Fallbrook, Calif.
A6LLJ	Damon D. Barrett, 681 Rockdale Drive, San Francisco, Calif.
A6LNH	Edward S. Kinney, 2500 Maywood, San Jose, Calif.
A6LQ	Loyd C. Sigmon, 3636 Woodhill Canyon Drive, North Hollywood, Calif.
A6LYL	6807 ASU ROTC, University of California, Berkeley 4, Calif.
A6MSP	David F. Vonk, 8107 Grimsby Avenue, Los Angeles, Calif.
A6NFP	John C. Ullman, 650 Pamlar Avenue, Campbell, Calif.
A6NKR	Marion J. Henson, 1706 Gibson Road, El Monte, Calif.
A6NOW	Walter J. Clark, Jr., 401–C Boyd Road, Concord, Calif.
A6OQY	Bradley D. Corley, 2d Det, 2d Sig Svc Bn, Two Rock Ranch Sta, Petaluma Calif.
A6PFO	Vernon G. Spaulding, 281 East Pentagon Street, Altadena, Calif.
A6PQ	Robert J. Woolverton, 1315 Clay Street, Apt. 2, San Francisco, Calif.
A6QPS	Louis A. Beer, 2270 15th Avenue, San Francisco, Calif.
A6RIY	Robert V. Klein, 644 Palmhaven Avenue, San Jose, Calif.
A6RXW	George M. W. Badger, 1838 Tacoma Avenue, Berkeley 7, Calif.
A6TV	Burton R. Cole, 207 Harvard Avenue, Fresno, Calif.
A6UJY	George J. Freisleben, 718 Southwood Drive, South San Francisco, Calif.
A6USA	Headquarters, Sixth Army, San Francisco, Calif.
A6VEX	Glenn A. Horn, 14514 El Camino Avenue, Compton, Calif.
A6VFT	Benjamin S. Hamilton, 4850 68th Street, San Diego 5, Calif.
A6VPG	Frank R. Humphery, Box K34, Rt #1, Lakeside, Calif.
A6VUE	Edgar L. Esterwold, 1231 Dover Lane, Santa Barbara, Calif.
A6VYY	Olen R. Beach, 1869 West 38th Place, Los Angeles, Calif.
A6WAE	Hq 4th Inf Div, Bldg 2900, Main Garrison, Fort Ord, Calif.
A6WAF	William O. Davis, Bldg 39, Field Annex, Sharpe Gen Depot, Lathrop, Calif.
A6WAG	Sacramento Signal Depot, Qrs #5, Sacramento 14, Calif.
A6WAH	Fort MacArthur Sig Officer, Fort MacArthur, San Pedro, Calif.
A6WAI	Hq & Hq Btry, 112th AAA Brig, California NG, 1800 Mission Street, San Francisco, Calif.
A6WAW	James R. Young, 1503 Crenshaw Boulevard, Los Angeles, Calif.
A6WBB	Lynn G. Rawlins, 30 Sonora Avenue South, San Francisco, Calif.
A6WFD	Cam Longley, Jr., 821 Plaza Drive, San Jose 10, Calif.
A6WFZ	LeRoy G. Hankins, Qrs 919D, Fort Barry, Calif.
A6WHP	Norman L. Francis, 546 Higuera Street, San Luis Obispo, Calif.
A6WLI	Norman Brooks, 654 55th Street, Sacramento, Calif.
A6WQD	Robert J. Allen, 1071 Burbank Boulevard, North Hollywood, Calif.
A6WRG	Kenneth I. Rubin, 5139 West 21st Street, Los Angeles, Calif.
A6YGZ	Rodney C. Rigg, 5242½ 14th Avenue, Sacramento, Calif.
A6YOY	John P. Lindley, 9153 Noble, San Fernando, Calif.
A6YRK	Horace B. Baker, 4020 Shasta Street, San Diego 9, Calif.
A6YZD	Warren A. Simmons, 5475 Chollas Station Road, San Diego 5, Calif.
A6ZBV	Cecil A. Crafts, 1439 Topeka, Pasadena, Calif.
A6ZFD	James L. Warbington, Rt #1, Box 557, Folsom, Calif.
A6ZID	Adolph T. Beyer, Two Rock Ranch Sta, Petaluma, Calif.
A6ZIO	Clarence W. Ellers, 15 Lomita Street, Monte Vista, Calif.
A6ZLX	Dean E. Stiles, 4616 Congress Avenue, Oakland, Calif.
A6ZQL	Clifford A. Frink, 2109 Dymond Street, Burbank, Calif.
A6ZZM	Millage C. Nolen, Two Rock Ranch Sta, Petaluma, Calif.
A7ATN	Forrest C. Albertson, 1701 Cannon, Helena, Mont.
A7BAQ	Austin L. Foster, RFD #1, Burton, Wash.
A7BSD	George L. Buck, Jr., Rt #2, Box 262, Bellevue, Wash.
A7BUS	John M. Carroll, RFD #1, P. O. Box 706, Pendleton, Oreg.
A7CAY	William F. Antes, 1422 North Prospect Street, Tacoma 6, Wash.
A7CJC	Stanley L. Rinehart, Box 2690, Rt #4, Spokane, Wash.
A7CKL	Carl L. Myers, 1244 North 30th Street, Billings, Mont.
A7CRL	Clifford A. Jessup, 910 East A Street, Moscow, Idaho.
A7CWL	Waino A. Lauri, 3239 West 61st Street, Seattle, Wash.
A7DYF	William T. Stratton, Jr., Box 13, Beaverton, Oreg.
A7ELH	Frank G. Burford, Sheriff's Office, Moscow, Idaho.
A7EUG	Leander A. Panter, Riverton Star Route, Bandon, Oreg.
A7EZC	Ervin W. Madsen, 555 South 1st West, Brigham City, Utah.
A7FBA	Henry L. Kearney, 400 Howard Avenue, Eugene, Oreg.
A7FIM	Robert J. Shull, 2215 4th Avenue, Seattle, Wash.
A7FIX	Victor S. Gish, 511 East 71st Street, Seattle 5, Wash.
A7FNS	Virgil V. Cowen, 4205 SW Gabel Lane, Portland, Oreg.

A7FPD	Jack L. Crawford, Rt #1, Box #96, Lake Grove, Oreg.
A7FQI	Ralph W. Kaufman, 4122 SE Pine Street, Portland, Oreg.
A7GNE	Florian J. Werthmann, 652 West 85th Street, Seattle 7, Wash.
A7GO	Clarence R. Goodwin, 1530 5th Avenue West, Seattle, Wash.
A7HKA	Roy A. Wanska, Box 542, Bellevue, Wash.
A7HTF	Virgil P. Barta, 1506 Charlotte, Pullman, Wash.
A7HVK	Gordon C. Lynch, Rathdrum, Idaho.
A7HYA	Albert F. Williams, 12015 75th Avenue South, Seattle, Wash.
A7IJR	Gilbert A. Paul, 1807 Hamlin Street, Seattle, Wash.
A7ILS	George A. Brennfleck, 2945 NE 53d Avenue, Portland, Oreg.
A7IPV	Philip F. Eddy, 744 South 14th, Corvallis, Oreg.
A7IRT	Arthur M. Compton, 608 Roseway Drive, Klamath Falls, Oreg.
A7IUY	James R. Shadduck, 1145 6th Street, Elko, Nev.
A7IWH	Wendell W. Motter, 1265 22d Street, Ogden, Utah.
A7IXD	Robert E. Baehr, 507 Milwaukee Avenue, Deer Lodge, Mont.
A7JAN	Vincent Hook, 3735 South Fawcett Avenue, Tacoma 8, Wash.
A7JFI	Philip E. Jemison, 301 South Jackson Street, Butte, Mont.
A7JGB	John Curtis, 132 West Lincoln Street, Tucson, Ariz.
A7JGT	Elmer A. Grankull, Navy Comm Station, Navy No. 926, c/o FPO, San Francisco, Calif.
A7JHX	Charles E. Swedblom, 17 Halsey Street, Apartment 3, Navy Heights, Oreg.
A7JIY	George E. Peek, 701 East Fifth Street, Tucson, Ariz.
A7JJC	Rola I. Morrison, 25 West First, South Preston, Idaho.
A7JJX	Robert G. Starr, 4709 SW 31st Drive, Portland, Oreg.
A7JSM	Robert L. Warnock, 4486 SW Washouga, Portland, Oreg.
A7JTB	John E. Ogden, 3117 NE 32d Avenue, Portland, Oreg.
A7JTF	William J. Dobyns, 3024 North 31st, Tacoma, Wash.
A7JTZ	John L. Shennum, Ronan, Mont.
A7JUS	Alfred E. Miller, 2106 East 47th, Seattle 5, Wash.
A7JWP	Del F. Kahan, 2331–H Fairview Avenue North, Seattle 2, Wash.
A7JXY	Leonard C. Phelps, 9611 Mary, Seattle 7, Wash.
A7KAO	Joseph A. Nieradzik, 1606 Simpson Avenue, Aberdeen, Wash.
A7KBO	Richard C. Raupack, 1325 Columbia, Bend, Oreg.
A7KDE	Charles K. Hammond, 568½ North Kingsley, Los Angeles, Calif.
A7KJV	Gerald W. Van Kol, 563 Kellogg Park, Portland, Oreg.
A7KSA	Clyde A. Sylvester, 4325 SE 75th Avenue, Portland, Oreg.
A7KWH	Alfred F. Benz, 1915 SE 29th Avenue, Portland, Oreg.
A7KXJ	Roland T. Onffroy, Box 2276, Boise, Idaho.
A7LAQ	James A. Eaton, 633 2d, Oswego, Oreg.
A7LBK	Earl V. Hawley, 524 Elm Avenue, Laurel, Mont.
A7LBX	Roland C. Ferguson, 7542 14th NE., Seattle 5, Wash.
A7LCR	William H. Nelson, 7521 Ridge Drive, Seattle 5, Wash.
A7LHI	William J. English, 3938 East Elmwood, Tucson, Ariz.
A7LI	Thurlow V. Wauchope, 7119 North McKenna Avenue, Portland 3, Oreg.
A7LOM	Wilbur E. Deacon, McKenzie Bridge, Oreg.
A7LSH	Harold L. Willingham, RFD #5, Box 208, Puyallup, Wash.
A7LVJ	Leslie M. Brimacomb, 508 East Washington, Lewistown, Mont.
A7LWG	Max A. Fuller, 211 East 14th Street, Tempe, Ariz.
A7MCR	George E. Gebhardt, 648 South 11th, Coos Bay, Oreg.
A7MDE	Charles W. Clay, Jr., 524 North Long, Greenacres, Wash.
A7MDF	Harry M. Barker, 625 North Argonne, Dishman, Wash.
A7MHT	Robert L. Hickerson, 1021 North 25th Street, Corvallis, Oreg.
A7MIN	Frank L. Hickerson, 1021 North 25th Street, Tacoma, Wash.
A7MIS	Benjamin W. Coleman, 513 Wooding Street, Aberdeen, Wash.
A7MPO	Jerold R. Nelson, 403 South 4th West, Brigham, Utah.
A7MTW	Arthur L. Cummings, 4220 SE Corbett Street, Portland, Oreg.
A7MYE	158th Inf Regt, Arizona NG, Randolph Park, Tucson, Ariz.
A7NAA	John H. Stewart, Window Rock, Ariz.
A7NEL	Norman A. Van Houten, 1845 East Oak Street, Phoenix, Ariz.
A7NEO	Clifford Steagall, 1800 East Mohave Street, Phoenix, Ariz.
A7NFE	Robert M. Roaney, 5918 NE 30th Avenue, Portland, Oreg.
A7NHA	Peyton J. Nelson, 1450 West 12th Avenue, Eugene, Oreg.
A7NHQ	Lowell S. Maw, 1325 24th Street, Ogden, Utah.
A7NKJ	Russell N. Staley, RFD #4, Box 116, Chehalis, Wash.
A7NKX	Alwyn N. Riley, Hq & Hq Btry, 36th FA Bn, Fort Lewis, Wash.
A7NLW	Jesse R. Calvert, Jr., 1001 Lawnridge Avenue, Grants Pass, Oreg.
A7NMJ	Jim B. White, 14 North Washington, Butte, Mont.

A7NMR	William G. Stewart, Rt #1, Box 136, Winslow, Wash.
A7NQA	Arthur L. Runnels, P. O. Box 404, Burns, Oreg.
A7NRV	Leon J. Creger, Lewiston, Utah.
A7NTI	Jack R. Price, 7412 SE Carlton, Portland, Oreg.
A7NUZ	Hayden B. Whitehouse, Qrs 11–A, Fort Douglas, Utah.
A7NVH	Kendall K. Fuller, 422 South Ninth, Bozeman, Mont.
A7NVV	Fred W. Schindler, Hq, Hq Co, 4th RCT, APO 731, c/o PM Seattle, Wash.
A7NWO	David J. Arcand, 795 29th Street, San Francisco 19, Calif.
A7NXG	Duane Peters, 121 North 1st East, Brigham, Utah.
A7ODG	Alva W. Stephenson, 1806 NE 67th Avenue, Portland 13, Oreg.
A7OES	Clarence M. Schmauch, 220 North Pacific, Dillon, Mont.
A7OLT	Robert G. Clark, 1519 Butternut Avenue, Richland, Wash.
A7ORT	Charles E. Ward, 2350 112th Street, Portland, Oreg.
A7QLV	Charles J. Schauers, 339 F Street, Port Townsend, Wash.
A7RFE	Richard R. Hulse, 1614 East Van Buren Street, Phoenix, Ariz.
A7WAC	Morgan Z. Evans, 287th Co, 2d ESB, Bldg 233, Fort Worden, Wash.
A7WAD	George H. Caple, Jr., Bldg 632, Vancouver Barracks, Vancouver, Wash.
A7WAE	Wendell W. Motter, 222 FA Bn, Utah NG, 441 23d Street, Ogden, Utah.
A7WAF	Hq & Hq Co, 161st Inf Regt, West 202 2d Street, Spokane, Wash.
A7WAG	163d Inf, Montana NG, 24 West Mendenhall, Bozeman, Mont.
A7WAK	3669th Ord Med Maint Co, 1100 North Main Street, Helena, Mont.
A7WAL	Hq & Hq Det, Arizona NG, 645 West Jefferson Street, Phoenix, Ariz.
A7WAP	218th FA Bn, Oregon NG, Block 800, Bldg 814, Portland AF Base 13, Oreg.
A7WAR	Co F, 163d Inf RCT, Montana NG, 309 5th Avenue, South, Lewistown, Mont.
A7WAS	Co "G," 163d Inf, Montana NG, Western Montana College, Dillon, Mont.
A7WAT	Post Signal Officer, Fort Lewis, Wash.
A7WAV	Hq & Hq Co 3d Bn, 163d Inf, Montana NG, 501 1st Avenue North, Billings, Mont.
A7WAW	Co "C," 186th Inf, Oreg NG, The Armory, Grants Pass, Oreg.
	James F. Onellion, 629 Central Avenue, Hollister, Calif.
A6HMG	Robert W. Bremer, 12721 Hortense Street, North Hollywood, Calif.
A6KCU	George V. Gillette, 14520 Magnolia Boulevard, Sherman Oaks, Calif.
A7AGA	Robert I. Hall, 4400 19th Avenue SW., Seattle, Wash.
A7NBX	John D. Swift, 1003 Ethridge, Olympia, Wash.

ALASKA

AL7ACX	Quentin S. Hoshal, Quarters 3014E, Fort Richardson, Alaska.
AL7AFS	Wesley U. Taylor, Fort Richardson, Alaska.
AL7AGN	Dean B. Mohr, 375th RCN SQ, Eielson AFB, Alaska.
AL7CYB	Donald K. Schirmer, 652 7th Avenue, Fairbanks, Alaska.
AL7FX	Clyde A. Cobb, c/o ACS, Nome, Alaska.
AL7KA	Eugene R. Bryan, Barrow, Alaska.
AL7PF	Paul I. Sell, U. S. Weather Bureau, Kotzebue, Alaska.
AL7QAJ	Frank E. Killins, Box 238, Nome, Alaska.

PACIFIC

AB6AAG	William C. Moran, Bldg 50, Apt D, Manana Vets Homes, Pearl City, T. H.
AB6AAQ	Roy R. Williams, Hq & Hq Det, Hawaiian Sig Opn Gp, APO 958, c/o Postmaster, San Francisco, Calif.
AB6AAT	William L. Halleck, 205 North Drive, Honolulu 18, T. H.
AB6AAX	Earle F. Cook, 616F Dawson Street, Schofield Barracks, T. H.
AB6AAY	Thomas W. MacClure, Qrs 373, Fort Kamehameha, Oahu, T. H.
AB6ABR	Fujio Abe, Puunene Village, Puunene, T. H.
AB6ACB	James A. Long, MARS Director, USARPAC, APO 958, c/o Postmaster San Francisco, Calif.
AB6ACJ	Norman A. Reynolds, Rad Opn Det, Hawaiian Sig Gp, APO 958, c/o Postmaster, San Francisco, Calif.
AB6ACL	Jacob D. Y. Sur, 116 Nanea Avenue, Wahiawa, T. H.
AB6ACU	Daniel E. Earhart, Bldg 183B, Room 3, Fort Shafter, T. H.
AB6ACV	Paul L. Maley, COMSUBPAC, Flag Allowance, c/o FPO, San Francisco, Calif.
AB6ACX	Gerard D. Furlong, Qrs 316, Fort Shafter, T. H.
AB6ADE	Dean L. Axene, 415 2d Street, NHA 1, Honolulu, T. H.
AB6ADK	William J. Koczon, 8309th SU, Hawaiian Sig Opn Gr, Rad Det, APO 958, c/o Postmaster, San Francisco, Calif.

AB6ADN	Walter B. W. Lum-King, 2738 Leialoha Street, Honolulu, T. H.
AB6ADY	Theodore E. Sharp, Military Sea Transportation Svc, Navy FPO 128, San Francisco, Calif.
AB6ADZ	Jay W. Dunwoody, 708 Bragg Street, Schofield Barracks, T. H.
AB6AEC	Gus H. Grisard, Box 548, APO 957, c/o Postmaster, San Francisco, Calif.
AB6AEH	Albert Robert McLane, 201 5th Street, NHA #1, Honolulu 15, T. H.
AB6AEL	Christopher C. Nichols, APO 957, c/o Postmaster, San Francisco, Calif.
AB6AEU	Robert J. Bond, Quarters 48, Fort Riger, Honolulu, T. H.
AB6AF	Leslie Coleman, 1959 AACS, APO 105, c/o Postmaster, San Francisco, Calif.
AB6AFA	Causton H. Robinson, 8605th Adm Area Unit, APO 957, c/o Postmaster San Francisco, Calif.
AB6AI	Manuel M. Camunias, c/o CAA, Palmyra Island, T. H.
AB6AK	Russell E. Calhoun, 411 1st, NHA #1, Honolulu, T. H.
AB6DK	Sadami Katahara, 183 Ku Drive, Wailuku, T. H.
AB6FX	Irvin S. Liner, 3137 Kaohinani Drive, Honolulu 17, T. H.
AB6HB	Thomas J. Larrabee, 2224B Aloha Drive, Honolulu, T. H.
AB6HW	Noboru Nakao, 821 Olive Avenue, Wahiawa, T. H.
AB6KL	Thomas N. Pauley, Ewa Beach, Honolulu, T. H.
AB6KVS	Clyde W. Baxter, Field Station, 8605 Adm Area Unit, APO 957, c/o Postmaster, San Francisco, Calif.
AB6MT	Kenneth E. Smith, Jr., 208 A 16th Street, Hickam AFB, T. H.
AB6NDT	Jack Reynolds, APO 957, c/o Postmaster, San Francisco, Calif.
AB6NFH	Jean D. Brayton, 8605 Adm Area Unit, Field Station, APO 957, c/o P. M. San Francisco, Calif.
AB6NI	Elmer R. Higgins, Qtrs 403, Schofield Barracks, T. H.
AB6OK	Bernard K. Diffen, 3259 K Hayden Street, Honolulu, T. H.
AB6OO	George R. Helmick, P. O. Box 151, Schofield Barracks, T. H.
AB6QCF	John H. Travis, 5th Det, 2d Sig Svc Bn, APO 957, % Postmaster San Francisco, Calif.
AB6QH	Buel J. Hastin, 1954 St. Louis Drive, Honolulu, T. H.
AB6QQJ	Alexander Pappas, 8309 AU, Rad Opn Det, APO 958, c/o Postmaster San Francisco, Calif.
AB6RF	George A. Barnard, III, P. O. Box 781, Kaneohe, T. H.
AB6SU	Jonah K. Keawe, 2440 Rooke Avenue, Honolulu, T. H.
AB6TA	James Y. Takamoto, P. O. Box #86, Kalaheo, T. H.
AB6UP	Gerard D. Furlong, 8274th SU Hq ORC, APO 958, % Postmaster, San Francisco, Calif.
AB6UQ	Aaron Brenessel, 403–B Uluniu Street, Lanikai, Oahu, T. H.
AB6USA	Signal Service, USARPAC, Hq Hawaiian Signal Operations Group, APO 958, c/o Postmaster, San Francisco, Calif.
AB6UV	Floyd C. Hurst, 86 Nakeke Street, Wahiawa, Oahu, T. H.
AB6UZ	Carl J. Kunz, 12 Naska, Kahului, T. H.
AB6VN	Douglas M. Fukunaga, 1393–E Linapuni Street, Honolulu, T. H.
AB6VO	John R. Bell, Qrs 836, Area J. Schofield Barracks, T. H.
AB6VV	Richard S. Ferrell, APO 957, c/o Postmaster, San Francisco, Calif.
AB6WAA	1st Plt. 8309 SU, Radio Opn Det, APO 958, c/o Postmaster, San Francisco, Calif.
AB6WAB	Schofield Amateur Radio Club, Field Sta, 8605th Adm Area, c/o PM San Francisco, Calif.
AB6WC	John E. Tommaney, 203B Wilson Street, Hickam AFB, Honolulu, T. H.
AB6WNG	2nd Bn, 298th Inf, Hawaii NG, Schofield Barracks E Range Guard Area, Wahiawa, Oahu, T. H.
AB6WQ	William H. P. Chow, P. O. Box 4011, Honolulu, T. H.
AB6WS	Gerald J. Collins, Box 128, Tripler Gen Hosp, APO 438, % Postmaster San Francisco, Calif.
AB6YL	Robert F. Bowker, P. O. Box 1250, Lanikai, Oahu, T. H.
AB6YO	William J. Bertele, WHSE #4, Ala Moana Nr Richard Street, Honolulu, T. H.
AB6ZD	Lawrence K. C. Ching, 1550 Kokea Street, Honolulu, T. H.
AB6ZI	Thomas W. Mitchell, Qrs 46–A, USNCS Navy 41, Wahiawa, T. H.
AB6ZS	Lawrence F. H. Zane, Veterans Dorm, University of Hawaii, Honolulu, T. H.
	Harold L. Beckham, Jr., 8605 AD Area Unit, Field Station, APO 957, c/o Postmaster, San Francisco, Calif.
	Donald J. Lynch, Hawn, Sig Opn Gp, 8309th Rad Opn Det APO 958, c/o Postmaster, San Francisco, Calif.
A7GNR	Maurice L. Monson, 8605th Administrative Area Unit, APO 957, c/o Postmaster, San Francisco, Calif.

U. S. GOVERNMENT PRINTING OFFICE: 1951

Procedure Note

The November, 1950, issue of the Sixth Army MARS Bulletin carried an illustration of a suitable message re-heading procedure for use when exchanging traffic with non-MARS amateur stations. That illustration is reprinted here as a desirable supplement to Manual SIG 439–1.

Assume a message received by A6USA from WAR is for relay via amateur facilities to station JA2HQ.

A6USA DE WAR NR5
NM—151800Z
FM WAR
TO PVT JOHN DOE
APO 500 C/O PM SF
GRNC $\overline{\text{BT}}$

Before transmission to JA2HQ the conversion from MARS to amateur (ARRL) procedure would be:

JA2HQ DE W6USA NR5 K4USA NCK WASHINGTON DC 1PM NOV 15
TO PVT JOHN DOE
APO 500 C/O PM SF
$\overline{\text{BT}}$

In reverse the process would be like this, with W6USA receiving from an amateur station a message to be forwarded via MARS:

W6USA DE JA2HQ NR45 JA5AL CK16 ETA JIMA JAPAN 6PM NOV 15
TO PVT JOHN DOE
17TH SIG SVC CO
SOUTH POST FORT MYER VA
$\overline{\text{BT}}$

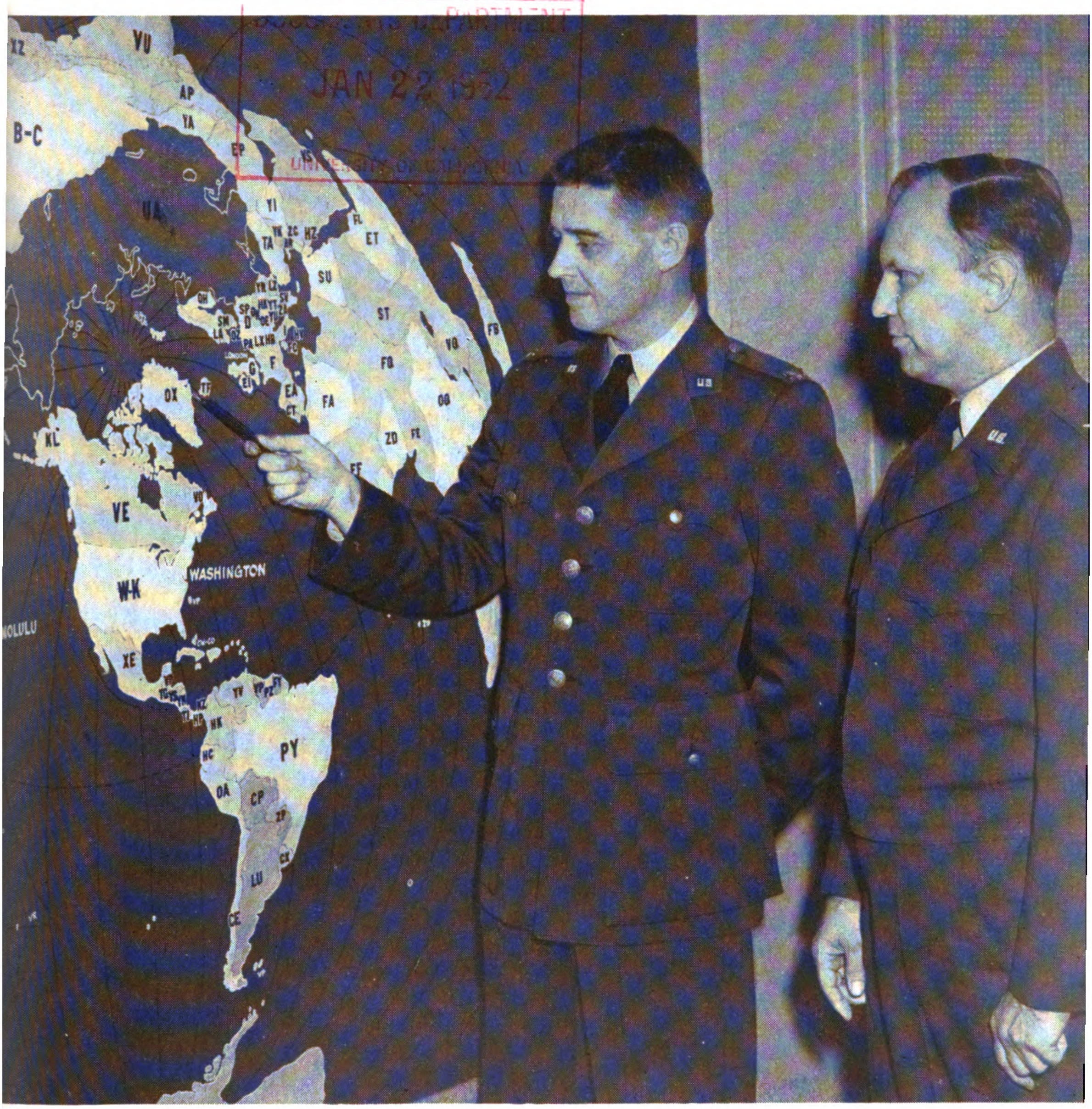
Before A6USA puts this message on a MARS circuit the heading must be converted from amateur to MARS procedure, thus:

WAR DE A6USA NR1
NM—150100Z
FM JA5AL ETA JIMA JAPAN NR45
TO PVT JOHN DOE
17TH SIG SVC CO
FORT MYER VA
GR16 $\overline{\text{BT}}$

THE PROCEDURE OUTLINED HERE SHALL NEVER BE USED WITH MESSAGES OF AN OFFICIAL NATURE THAT SHOULD REMAIN IN MARS CHANNELS * * *

MARS BULLETIN

DECEMBER 1951
Vol. 2 No. II



Military Amateur Radio System

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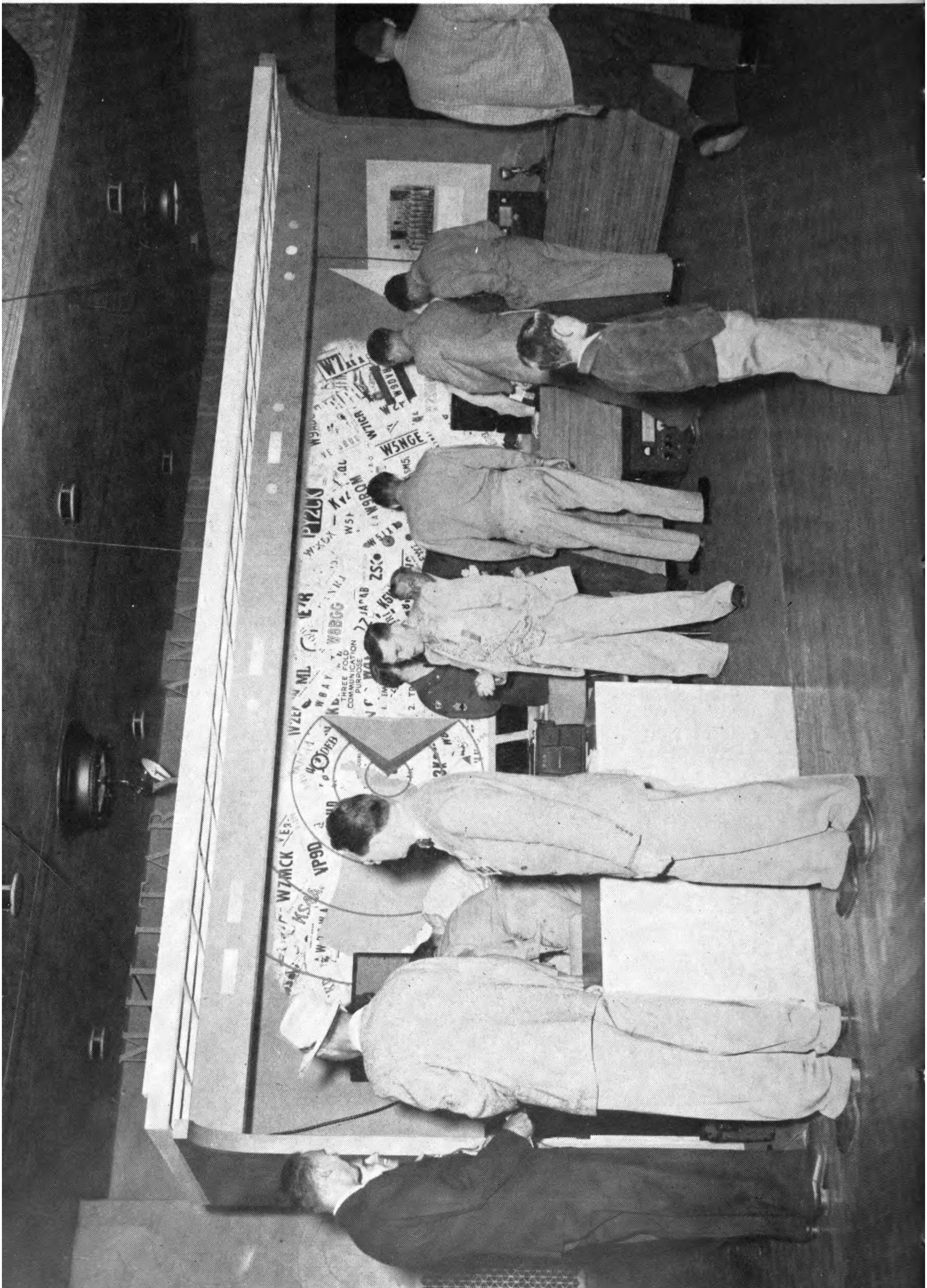
PENTAGON BUILDING, WASHINGTON, D. C.


W5NGE
THREE FOLD COMMUNICATION PURPOSE

MARS BULLETIN

DECEMBER 1951

VOLUME II NUMBER 2

ABOUT THE COVER: *Colonel G. W. Wildes, Chief, Operations Branch, points to the route flown by the two Air Force pilots in the Fox Able Four operation to the Chief, Air Force Communications Systems Division Colonel G. A. Westphall. See story on page 7.*

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975579—51——1

CQ . . . CQ . . . CQ . . .

The Military Amateur Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control. The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate chief; either to Chief, MARS-Army, room BE 1000, the Pentagon, Washington 25, D. C., or Chief, MARS-Air Force, room 5B462, the Pentagon, Washington 25, D. C.

EDITORIAL

Continued growth! That is the story of MARS. And as the Military Amateur Radio System begins its fourth year of operation every member can take pride in the accomplishments to date. It is to be hoped that MARS members will be able to look back on 1952 and remark even greater progress than we can see looking back on 1951.

We must keep up our strength. We must utilize our military frequencies in such manner that definite gains can be measured and increased benefits to military training and emergency radio facilities clearly shown.

New blood is coming into the MARS via the novice class license. These newcomers are welcomed officially when they join MARS. Breaking them in on MARS nets, indoctrinating them in the practical methods of communication practices is a job for each of you. The National Production Authority, in announcing a policy to assist amateur radio operators purchase "critical" items needed in the successful operation of their home stations, quoted defense officials as stating a need for 200,000 amateurs. Since less than half that number actually are licensed at present it seems unlikely that the unidentified "defense officials" will achieve their goal. It does mean that radio amateurs and their capabilities for providing emergency radio communication are recognized, and that cities, states, and the Federal Government alike are looking to amateur radio as a bulwark in providing necessary emergency facilities where and when they are needed, at modest expense and with modest effort.

How can MARS serve? Primarily MARS high level circuits are going to be included in Army and Air Force planning. This probably will include networks down to the state level.

Individual operators, in their home stations, will receive their greatest benefits; in most cases, through the drill periods and the training facilities made available to them. The opportunity to learn and practice joint procedures enables an individual to hold himself in a state of "operational readiness" should he be required to assist or supplement the efforts of official military circuits and personnel.

MARS is glad to be able to extend this training program to all amateurs who wish to affiliate with the system. But membership in MARS does not mean that PRESTO, at the drop of a hat—or the declaration of a national emergency—you, as a private citizen, are going to be called into active military service. In fact, unless you have an M-Day assignment, or unless you are affiliated with the reserves in some way,

there is little likelihood that your day-to-day existence will be affected one way or the other by MARS affiliation. It does mean, that if a military commander has a requirement for a radio circuit to or near the locality where your station is in operation he may be able to use you and your equipment until the need subsides or an official circuit can be engineered and installed.

In working out local emergency or disaster plans, be sure to consult your local civil defense authorities and your local Red Cross officials. The Chief Signal Officer, Army, and the Director of Communications, Air Force, keep in constant touch with the national headquarters of both organizations. National plans are worked out jointly. Local plans should likewise be coordinated and reports always submitted through proper organization channels. Bypassing one step in the chain of command may result in ineffective operation because someone wasn't kept informed of the in-service plan and equipment set-up.

Newcomers and technicians are eligible for MARS memberships under a recent ruling by the Chief Signal Officer, Army, and the Director of Communications, Air Force.

The authorization was announced by representatives of the Chiefs, MARS at the Central Division Convention, ARRL, 20 October 1951. Objectives are to build networks of novices and/or technicians to—

Assist in building up operating skills by on-the-air network participation.

Develop proficiency in the proper usage of military communication procedures (JANAP).

Coordinate military methods with normal amateur practices to insure rapid and effective liaison in the event of peacetime disaster or national emergency.

Operation for MARS novices and technicians will be limited to the frequency 3497.5 kc. A maximum power of 75 watts to the final stage of the transmitter is allowable. Operation will be crystal controlled, A–1 emission.

Except for operating limitations novices and technicians are entitled to all training advantages and privileges enjoyed by general and advanced class amateurs who are MARS members.

Applicants who are not members of one of the armed services or their reserves must be at least 21 years of age and possess the necessary equipment to operate on the MARS 75 meter frequency.

Interested novices and technicians are invited to write their nearest Army or Air Force Commander for additional information and application forms. Since Army and Air Force MARS have separate operating networks, prospective applicants should indicate with which service they desire to affiliate.

NOTES ON OVERTONE CRYSTAL OSCILLATORS

By Technical Sergeant Harry T. Simms (AF4HBD)

For several months I have contemplated the possibility of building a crystal-controlled VHF 144–148 mc converter for use with my AR–88 receiver. My plan was to use the receiver's 12–16 mc tuning range as a "tuneable" I-F amplifier working in conjunction with a fixed 132 mc oscillator.

I approached the oscillator problem with crystal control in view. There were two methods by which the desired 132 mc signal energy might be obtained. One was to "pick off" the high order electrical harmonic of a conventional crystal oscillator. The other was to use a high-frequency overtone crystal, which would require less multiplication and at the same time afford greater frequency stability.

The first method was discarded because of its requirement of numerous multiplier stages, and the attendant possibility of spurious frequencies in the output. I approached the latter method as being the more desirable, since a 44 mc overtone crystal would triple readily with a minimum of tubes and afford a fairly pure source of 132 mc energy for injection into the mixer.

An investigation into the matter of 44 mc overtone crystals brought the answer that they cost more bucks than I had to spend, and that they were not available as MARS surplus.

Then I came across an article by George H. Lister in the November 1950, issue of "Electronics." From this article I learned that overtone activity could be found in ordinary crystals, and figure 1 shows

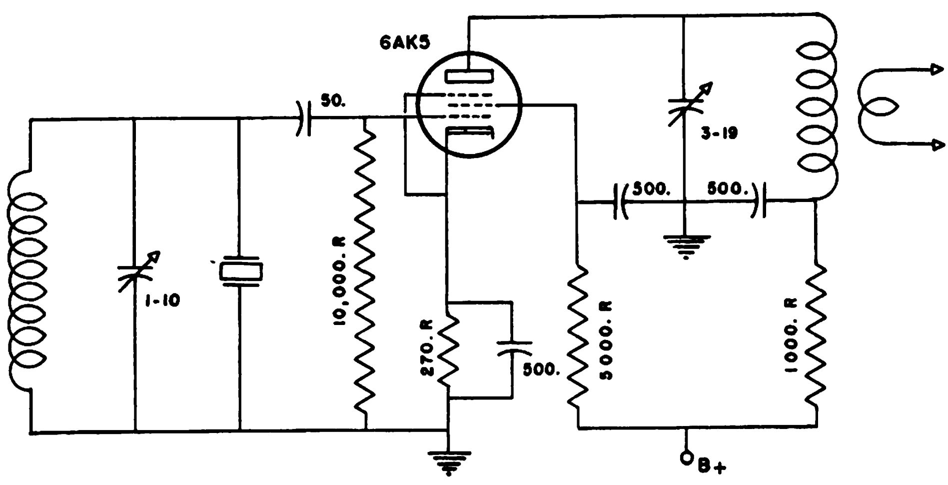


FIGURE 1

an oscillator circuit that Lister states will cause a crystal to oscillate up to its 15th overtone.

I tested this circuit and found that a large number of the crystals on hand would oscillate on their 3d overtone, and some could be made to work on their 5th overtone. A small neon lamp was used to detect oscillator output; and it was not sensitive enough to detect activity at the higher overtones.

In discussing my problem I gathered some ideas from W4AO of CRPL and W3GKP of NRL. W3GKP suggested that I use a grid-dip oscillator as a sensitive indicator of overtone activity.

The "grid-dipper" that I used to try this idea was a Model 59 Megacycle Meter. To prepare a crystal for test a small link of several turns of hook-up wire was connected to the pins of the crystal holder. This link was then coupled closely to the "grid-dipper" inductor.

Crystal activity is indicated by a grid-current dip as the frequency control is adjusted to resonance with the crystal. This dip will be observed at the crystal fundamental. As the oscillator frequency is increased (changing inductors and recoupling), a new dip will occur at each of the overtone frequencies.

The overtone frequencies at which a crystal will oscillate are approximately the same as—but not equal to—the odd multiples of the crystal fundamental. When seeking overtone activity the crystal should be coupled to the inductor of the appropriate range, and the "grid-dipper" frequency control rotated in the general vicinity of the odd multiple in search of the overtone dip. The higher overtone frequencies may vary as much as 25 kc or more from the exact odd multiple.

The results obtained using the "grid-dipper" were surprising. Crystal activity at 13th and 15th overtones was common with most of the crystals I tested, and one 3497.5 kc MARS crystal showed activity up to its 23d overtone. This is an interesting experiment. If you have a grid-dip oscillator you may wish to try it, too.

I then decided to build myself an overtone oscillator, using a circuit that was simpler and which would work with one-half of a 6J6 and only one tuning adjustment, as shown in figure 2. This circuit was designated for operation with overtone crystals, and a Bliley 14,335.1 kc type AX2 unit (having a 4785.3 kc fundamental) oscillated with ease on its 7th and 9th overtones.

The trick of this circuit is to place sufficient inductance in series with the crystal to offset capacitive loading at the overtone frequency. An effect of this inductance is to make the circuit self-resonant, and it must be so proportioned that this series resonance develops at a frequency higher than that at which the crystal is operating.

In tuning, approach resonance from the low-frequency side. If the crystal is going to oscillate on its overtone it should show activity

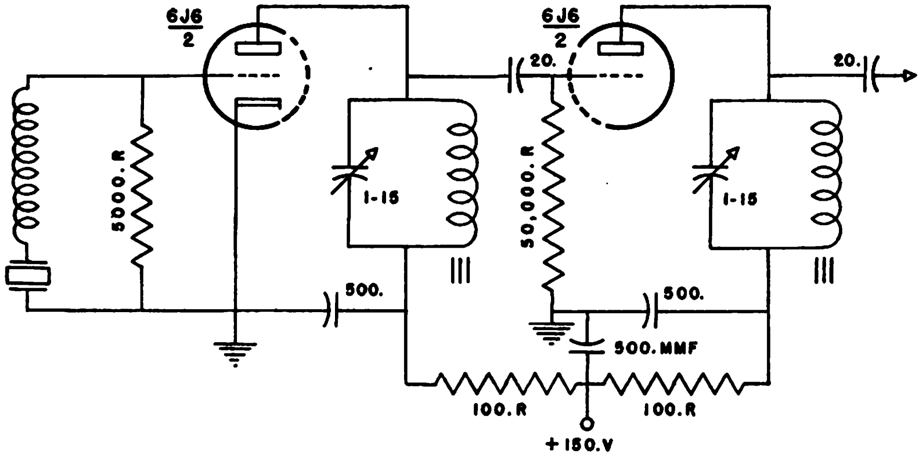


FIGURE 2

just before you reach the point of self-oscillation. A simple method of measuring this activity is to solder one end of a 220,000-ohm resistor to the grid of the oscillator, connecting a 20,000 ohms-per-volt meter in series between the resistor and ground. Oscillation, either overtone or self-excited, will appear as rectified grid voltage. The desired point of operation for the overtone crystal is just off the low-frequency end of the region of self-oscillation. The indication of this operation is shown when a sharp peak of grid voltage appears below the broad rise of grid voltage that comes with self-oscillation.

However, if there is no separate "peak" but there is, instead, a sharp dip in the self-oscillation indication, it is a sign that the overtone frequency and the series-resonant frequency are too close. This condition must be avoided; and it may be corrected by reducing the inductance of the grid coil slightly to move the series-resonant point to a higher frequency.

When experiment made it certain that some crystals wouldn't oscillate on an overtone, their holders were taken apart and the crystals and holders examined. In some cases the crystal edges were found to be chipped; when this was the case the chipped portion was ground off with a fine emery stone. If the crystal holder didn't have plates with all four corners of both plates raised, and no raised center, the plates were changed to this type and this in many cases produced the desired activity. Some crystals would not produce overtone oscillation at all, and I am now experimenting to see just what it takes to get them started.

The lower-frequency AT-cut crystals have thus far shown themselves to be more active than the higher-frequency BT-cut crystals in overtone operation and should not be ignored in looking for a crystal to fill your bill.

In the final effort the first section of the 6J6 was used to get the crystals to oscillate in the 42 to 48 mc region, and the second section

was used as a tripler and quadrupler to the 125 to 144 mc region. Eighty meter crystals were made to oscillate in their 13th overtone even though they were quite old. A MARS 3601.25 kc crystal was sufficiently active to oscillate on its 13th overtone and quadruple to 140.40 mc, or the 39th harmonic of its fundamental frequency. This is good performance for one tube, no matter how you look at it.

The operation of the overtone oscillator circuit may be checked by listening on a stable receiver. You will not hear any signal at the crystal fundamental, nor at any of the electrical harmonic points below the frequency of overtone operation. The lowest frequency signal to be heard will be that of the overtone at which the crystal is oscillating. Above that frequency may be found electrical harmonics of the overtone frequency. If the overtone oscillator frequency is unstable (if you can "play a tune" by approaching the oscillator with your hand), it is running self-excited and should be checked.

MULTIPATH TRANSMISSION SIMULATOR

Signal Corps Engineering Laboratories have designed and constructed an experimental laboratory device known as a Multipath Transmission Simulator, which can be used to reproduce certain characteristics of radio propagation through the ionosphere under controlled laboratory conditions. The equipment has been employed in the test of carrier shift facsimile signals by transmitting the signals over the Multipath Transmission Simulator, using carrier shift modulation, in which photographic prints are made over the circuit. It is also planned to utilize the device in test of amplitude modulation with exalted carrier reception.

CRYSTAL RECTIFIERS

A contract has been awarded Sylvania Electric Products, Inc. by Signal Corps Engineering Laboratories for the study and development of a mixer crystal and mixer block for the 16,000 megacycle bank.

MARS AND FOX ABLE FOUR

Lt. Col. John W. Dell and Maj. D. V. Neill, USAF, plot the route for Fox Able Four.

The story of Fox Able Four has been widely publicized in press and radio features. That is, part of the story has. The story of MARS and Fox Able Four has not been told until now.

Fox Able Four—that was the code name assigned to the test flight which started from Manston, England, on 22 September 1950 with Mitchel Air Force Base as a goal. Colonels David Schilling and Andrew Ritchie were pilots of the two F–84E jet fighter planes which demonstrated the value of midair refueling for jet aircraft. That part of the story is well known. The part which remains is the story of radio, for a secondary purpose of the plan was to check the adequacy of communications and air rescue facilities for movements of large numbers of aircraft. MARS radiotelephone channels between Washington, D. C., and stations of the Newfoundland Base Command, Labrador and Greenland, provided a ringside seat at the history-making experiment for Lieutenant Colonel Albert W. Schinz, Fox Able Four controller, from his office in the Pentagon Building, Washington, D. C.

975579—51——2

McAndrew Air Force Base was a focal point for communications tie-in and relay of radio traffic. Because of its intermediate location, northern stations and MARS Headquarters Station AIR in Washington were all heard continuously.

Long lines telephone connections between Harmon AFB, Pepperrell AFB and McAndrew AFB made possible direct radio relay transmissions with an assist from McAndrew (AK2HW) whenever difficulty was experienced in maintaining QSO.

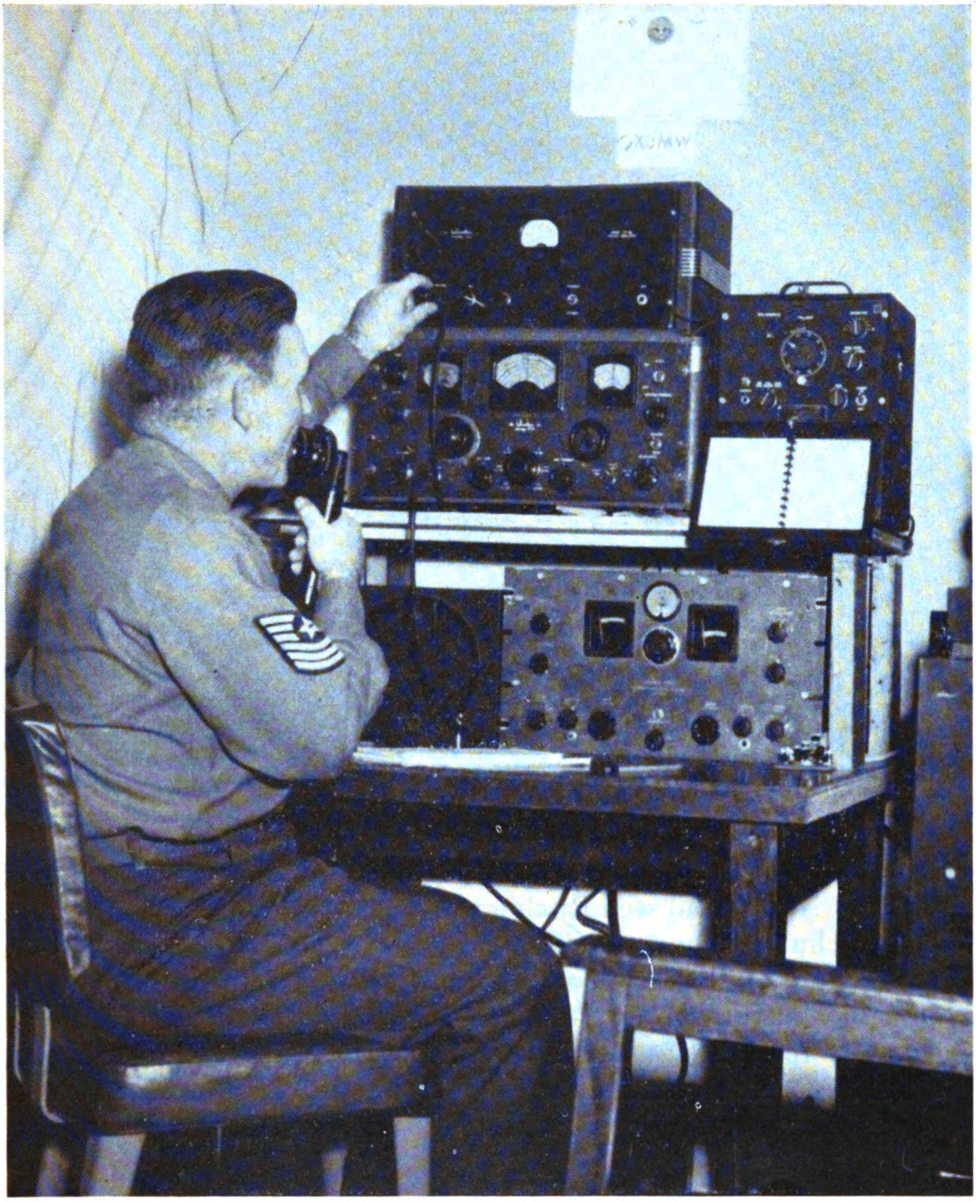
AK2FL, at Pepperrell is headquarters station for MARS Northeast Air Command. The station consists of a Federal 27OD transmitter remodeled to provide complete coverage of all MARS frequencies. Lieutenant Colonel George D. Meserve, licensee, operates both voice and CW. A receiving section in the station consists of an SX 28, a Super Pro, Panadaptor and 10 meter beam rotator panel. Patching facilities are available, permitting simultaneous patching of two separate offices on the same transmissions. This system proved useful for patching key officers in on phases of the Fox Able Four flight.

Construction work on the station was done by Master Sergeant Jerry B. Henderson who operated the station during much of the FA–4 movement.

Jerry, hometown Louisville, Kentucky, is ex-5CMG, ex-9USA, and presently holds W4KOT. A former Signal Corpsman, Jerry was active in the amateur bands from Fort Bragg, North Carolina, prior to his assignment to Pepperrell.

Operators at McAndrew AFB include Chief Op Master Sergeant David Stockslager who is in charge of AK2HW, holds a personal MARS call AK2DS, and is licensed in the states as W4OEQ from Pope AFB in North Carolina; Technical Sergeant Clarence L. Englebrecht (W7KUW) who was with MARS station AF7FAH at Hill AFB in Utah before going to McAndrew. During the Los Angeles earthquake of 1932 Clarence was on the air from his home town, Garretson, South Dakota. He handled more than 500 messages during the disaster. Before entering the Air Force Clarence was a commercial radio announcer for station KFAB, Lincoln, Nebraska. He was known to listeners as Bob Lewis; Staff Sergeant Jerry M. Clark is a native of Texas and a graduate of both the Air Force Mechanics School and the Radio Operators School; Another newcomer to amateur radio is Private Nolan A. Nather a graduate of the Radio Operators School and a native of Madison, Minnesota.

Master Sergeant Louie L. Felton, operator of the MARS station at Narsarssuak, Greenland (AK2LF), was a key man also. Louie handled more than 100 messages from the beginning of the flight until Colonel Schilling successfully landed at Limestone, Maine. Colonel Ritchie had bailed out 20 miles short of the base at Goose Bay, Labrador. He ran out of fuel and was unable to refuel because of a bent valve tip on the refueling device.



MARS STATION AK2F1.

Air-ground communications made possible almost immediate rescue. The report—"Plane unable to refuel; in doubt of reaching Goose Bay," started things humming. The message was relayed to Washington via MARS. Technical Sergeant Ira Matteson, operator at MARS Headquarters in Washington had a wire circuit open to Colonel Schinz. Schinz, assisted by Lieutenant Colonel John W. Dell and Major D. V. Neill was able to map out a plan of rescue for the Colonel. He also ordered Colonel Schilling not to try for Mitchel AFB but to land at Limestone, Maine.

Rescue ships were alerted at Goose Bay and dispatched to intercept the in-trouble aircraft. A helicopter pilot spotted the F–84E

T/Sgt. Ira Matteson.

as it splashed into Lake Melville, about 40 miles inland from the cold Atlantic. No one had seen Ritchie when he bailed out minutes before. His parachute canopy caught in a treetop and Ritchie slid to the ground uninjured. Two hours later he was safe, warm and dry at Goose Bay, thanks to an alert Air Rescue crew, and was reporting personally to the Fox Able Four controller in Washington, thanks to an efficient Mars circuit.

THE VACUUM TUBE

In part II we observed that the tetrode is limited by an effect known as secondary emission—the result of an electron, traveling at a high velocity, coming into contact with the plate with such force that it splatters other electrons already on the plate and knocks them off into the interelectrode space. Here they become known as secondary electrons and are attracted back to the positive voltage on the screen grid.

If a third grid is placed between the screen grid and the plate of the tetrode, and is connected to the cathode so that it has the same charge as the electrons, it will act as a repelling force and will force any secondary electrons back to the plate.

This suppressor grid is the only difference between a tetrode and a pentode tube. Both the cathode and the suppressor grid are at the same potential. A common application of a typical pentode tube is for use in the power-output stages of radio receivers.

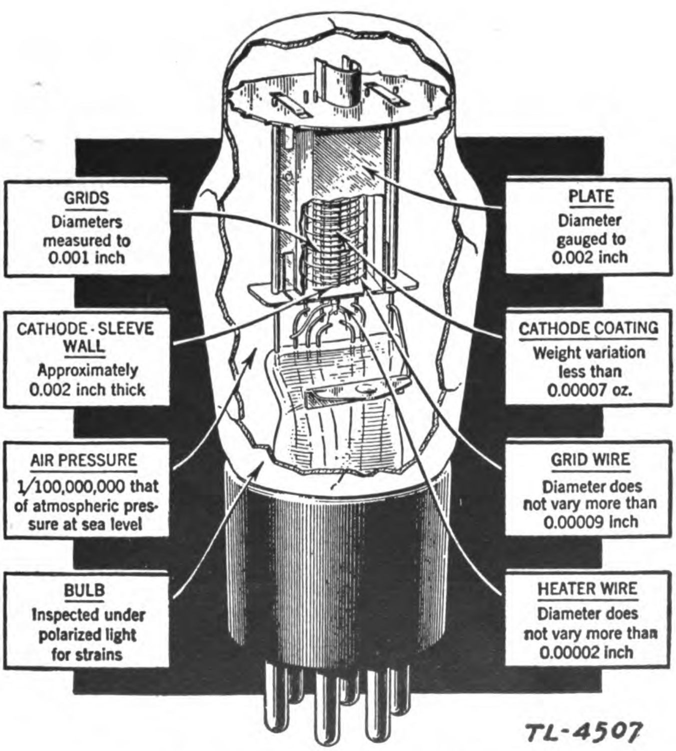


FIGURE 1. TYPICAL PENTODE.

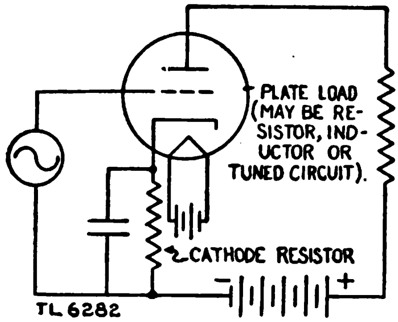


FIGURE 2. TRIODE AMPLIFIER CIRCUIT WITH SELF-BIAS.

THE CATHODE

Tubes frequently are classified according to the method of heating the cathode.

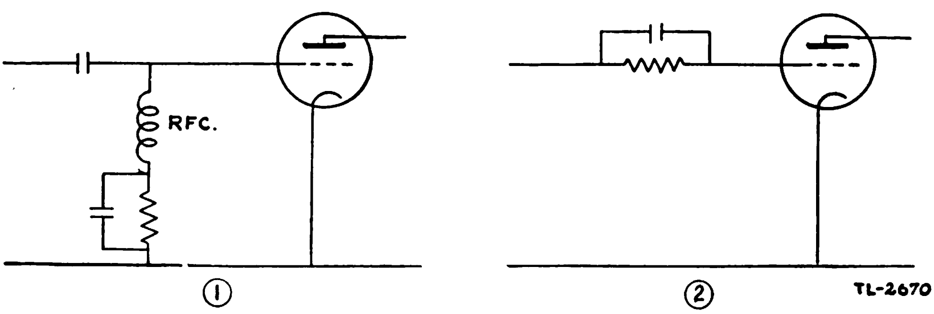
The directly heated cathod used in receiving tubes is of the oxide coated type, consisting of a wire or ribbon of tungsten directly heated by passing a current through it. This type of cathode has the disadvantage of introducing a ripple in the plate current which produces hum in the output when operated on ac.

Hum from this source may be eliminated by using the indirectly heated cathode which consists of a thin metal sleeve, coated with electron-emitting material, inclosing a tungsten wire or ribbon which acts as a heater. In the indirectly heated cathode all parts are at the same potential.

BIAS

Negative grid bias voltage may be obtained in several ways. One of the simplest methods is the fixed bias where a suitable negative voltage is obtained from a fixed source, such as a battery or power supply.

A vacuum tube circuit can be arranged to produce its own grid bias,



① *Shunt arrangement.* ② *Series arrangement.*

FIGURE 3. GRID-LEAK BIAS CIRCUITS.

and such a method is known as self-bias. A conventional method of self-bias employs the cathode-return-resistor bias. The plate current flows through the resistor causing a voltage drop which makes the grid negative with respect to the cathode. The cathode-resistor bias is widely used both in transmitters and receivers since it eliminates the need for a separate source of bias voltage.

The value of the resistor is determined by the bias required to and the plate current which flows at that value of bias, as found from the tube characteristic curves; with the voltage and current known, the resistance can be determined by Ohm's Law.

$$Rc=\frac{E\times 1000}{Ic}$$

where

Rc=Cathode bias resistor in ohms
E=desired bias voltage
Ic=total dc cathode current in milliamperes

Grid-leak bias is another form of self-bias, and is used under conditions where grid current flows. The bias results from the drop in potential across the resistor when current flows during the positive half of an a-c signal. The resistor is called a grid leak and the bias is essentially steady in character since the capacitor across the leak offers a low impedance to alternating current. The obvious disadvantage of grid leak bias is that if, for any reason, the excitation is removed, the bias is removed also, and the plate current may build up to become dangerous to the vacuum tube.

For grid-leak bias:

$$Rg=\frac{E\times 1000}{Ig}$$

where

Rg=grid leak resistance in ohms
E=desired bias voltage
Ig=d-c grid current in milliamperes

Transmitter amplifiers sometimes combine the grid-leak and fixed bias methods by using both types in series.

Some amplifier tubes, known as zero-bias tubes, are designed to operate with the grid at cathode potential.

FILAMENT CENTER TAP

When a filament-type cathode is heated by ac, the hum which is introduced can sometimes be minimized by making the two ends of the filament have equal and opposite potentials. This can be accomplished by center-tapping the filament transformer winding. If it is not desirable to center-tap the winding, the same result can be achieved through use of a center-tapped resistor of 10 to 50 ohms.

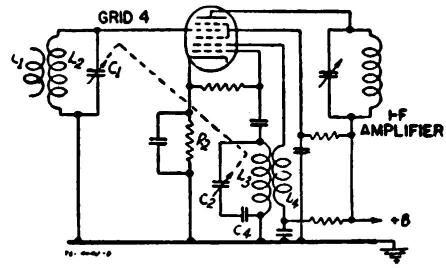


FIGURE 4. COUPLING OF OSCILLATOR TO MIXER BY MEANS OF MODULATING ELECTRON STREAM FROM CATHODE OF MIXER TUBE.

SPECIALTY TYPE TUBES

A trend in tube design is toward development of specialty type tubes which allows one tube to do the same work previously requiring two or more tube types. Since many of these types require more than three electrodes they are frequently classed as multi-electrode types.

An example of this multi-function tube is the pentagrid converter, a single envelope which combines the oscillator and the frequency mixer. This tube has five grids; it depends on the electron stream from the cathode for coupling. The plate current is modulated by variations in the cathode emission. Grids 1 and 2, and the cathode, are connected to a conventional oscillator circuit and act as a triode oscillator. Grid 1 is used as the grid of the oscillator; grid 2 is the plate. The two grids and the cathode combine functions to form a composite cathode which supplies an electron stream to the rest of the tube. This stream of electrons varies as the oscillator frequency. The signal voltage is applied to grid 4 which controls the electron stream so that the plate-current variations are a combination of the oscillator and the incoming signal frequencies. The plate circuit of the pentagrid converter is tuned to the desired intermediate frequency. Grids 3 and 5 are connected together within the tube so as to form a screen grid which serves to accelerate the electron stream and to shield grid 4 electrostatically from the electrodes.

In figure 4 the incoming r-f signal is fed from L_1 into the tuned grid circuit of L_2 and C_1. It then is applied to the control grid of the tetrode section of the tube at Grid 4. In the oscillator section of the tube, the r-f energy is fed back from the plate circuit inductance L_4 to the tuned grid circuit consisting of L_3, C_2 and C_4. C_2 is the main tuning capacitor. Grid bias for the tetrode section of the tube is obtained by the flow of plate current through the cathode resistor R_2. The incoming signal, and the oscillator voltages are heterodyned in the electron stream flowing from cathode to plate. The output voltage is a beat frequency equal to the difference between the in-

coming signal and the oscillator frequencies. The capacitor C_4, placed in series with the tuning capacitor C_2, is called a padding capacitor. It is necessary because the frequency of the oscillator tuned circuit is higher than that of the r-f circuit. It is necessary to have low value of inductance and capacitance in the oscillator circuit in order to obtain a higher frequency. In some superheterodyne sets this is accomplished by having a smaller capacitor and coil in the oscillating circuit. In others, such as the one described here, it is convenient to use the same size capacitors in both circuits and reduce the value of the oscillator capacitor by placing a fixed or variable capacitor in series with it.

TUBE LIFE

Most MARS members have a pretty good idea, based on actual experience, what the life of tubes in their own equipments should be. This will not always be the rated life of a tube. Even tubes of the same type, placed in service simultaneously, seldom last the same length of time.

With the increasing possibility of a short supply of critical radio and electronic tubes it is a good practice for the amateur to test his tubes periodically as a check against service reactions from those which may be deteriorating more rapidly than might normally be expected.

Knowing the factors that sometimes contribute to tube failures can be helpful. Here are a few:

FILAMENT ACTIVITY

The most frequent cause of tube failure is through loss of activity of the cathodes. This is caused by a change in the cathode surface which makes it less efficient as an electron emitter.

Tubes of the high vacuum type generally are operated in temperature saturation, with the cathodes emitting many times the number of electrons actually needed. As the tube is used, fewer and fewer electrons are emitted. Finally, the tube no longer is in complete temperature saturation. Space current decreases; plate resistance increases; transconductance and gain decrease.

Sometimes the filament in a vacuum tube just burns out. This is not a frequent cause of failure. Heaters in indirectly heated cathodes almost never fail from this cause.

High vacuum tubes may fail because of the presence of gas in the envelope. This gas may result from the admission of air through cracks in the envelope, or by gases, occluded in the electrodes and other parts of the tubes which, having escaped removal during the pumping process, are freed by the heat of operation. The presence of gas lowers the vacuum, thereby reducing the efficiency of the tube.

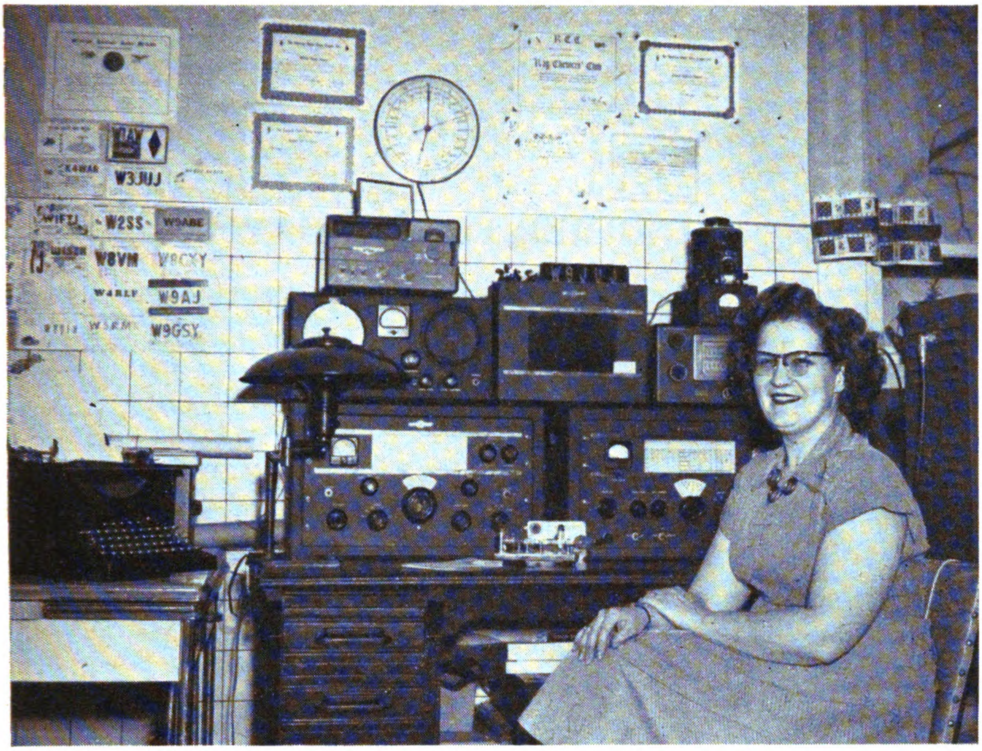
Grid leakage may be caused by the formation of a conducting layer on the glass surface within the tube between the lead-in wires or on the surfaces of other insulator used for maintaining spacings between elements. This can be caused by a deposit on the glass or insulation material from the surface of the cathode.

Vacuum tubes often become noisy because of mechanical defects such as a filament becoming loose in its supporting hooks. Slight mechanical vibration then causes a relative motion of the parts, creating excessive noise in the circuits to which the tube is connected.

Even when not actually loose, tubes may exhibit microphonic noise due to vibration of the filament or other parts.

LOW PRESSURE GLASS LAMINATES

A laboratory is being established for the fabrication of large Signal Corps parts and equipment, utilizing polyester bonded fibre glass plastic materials. Great interest has been shown by the Armed Services in the development of polyester bonded fibre glass because of the large size moldings which can be made at comparatively low cost. This material is very light in weight, has great tensile strength and is highly shock resistant. It has excellent high and low temperature resistance and good electrical properties. The tooling for large equipment such as antenna masts, telephone poles, radar reflectors and radomes is relatively cheap as compared with other methods of plastic or metal fabrication. Other large volume applications for which this type of construction is considered desirable are such items as battery cases, carrying cases and specialized types of packaging devices.



A9JUJ

MARS YL STORIETTE

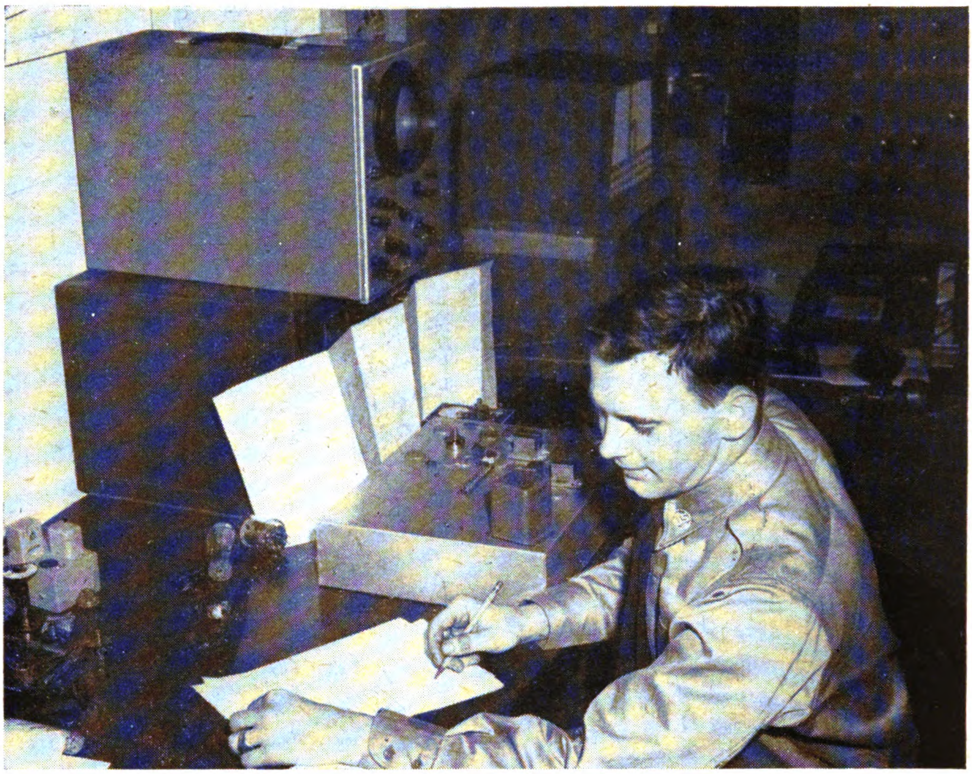
To some, Herb Shriner is the newest sensation in radio to come from Indiana. But for MARS members there's a Hoosier radio personality without peer near the city of Muncie. Mrs. Mildred Coulter is her name and she lives on R. F. D. # 2. Throughout the Military Amateur Radio System she's known as Peggy; her call sign, of course, is the familiar A9JUJ.

Peggy says: "I am the only ham in our family. The OM (John) doesn't object too much to my 'hamming'. I expect if it was the other way around, I would."

Her first rig, after getting her ticket in 1950, was an HT–17, running about 20 watts. Then she got a Collins 32–V2. Since neither the 32–V2 nor her Collins 75A1 receiver would tune the MARS frequency, she added a National S–54 and dusted off the HT–17.

Peg is most active on 40 and 80 meters. She is net control station of the Indiana CW net (QIN) two nights each week; net control station of a YL/XYL traffic net (PCN); a regular on the Domestic Overseas Net (DON), and calls into the Traffic Exchange Net (TXN) as often as possible.

1951 ARMED FORCES DAY



PVT. TOM GREENHALGH, AF1QYY

Receiving Competition

Three hundred and five operators have received certificates of merit signed by the Honorable George C. Marshall, Secretary of Defense, in recognition of making perfect copy of his Armed Forces Day message to radio amateurs. This represents 56 percent of the total participants (540). The message was transmitted at 25 w. p. m. by military stations AIR, NPG, NSS, and WAR on May 19, 1951.

Message from Secretary of Defense

ON THIS SECOND ARMED FORCES DAY, IT IS A PLEASURE TO GREET THE RADIO AMATEURS OF AMERICA THROUGH THE COMBINED FACILITIES OF THE ARMY, THE NAVY, AND THE AIR FORCE. TRADITIONALLY, THE RADIO AMATEUR HAS COMBINED A SPIRIT OF SERVICE

WITH HIS HOBBY. NEVER HAS THIS BEEN MORE IMPORTANT TO THE NATIONAL WELFARE THAN IN THIS CRITICAL YEAR. AS YOU COPY THESE WORDS, I WANT YOU TO KNOW THAT YOUR PARTICIPATION IN THE SERVICE SPONSORED RADIO AMATEUR SYSTEMS IS MUCH APPRECIATED BY ALL OF US WHO ARE CONCERNED WITH THE COUNTRY'S DEFENSE.

GEORGE C. MARSHALL
SECRETARY OF DEFENSE

Certificate Winners

W1's: ASJ, BDV, CBT, DWO, EOB, IKE, KWD, LZL, MD, NXX, OI, OQP, QFY, QIQ, QJM, RHU, SAS, TEB, TGE, TKX, ZR.

W2's: AFZ, AGO, ARO, AUS, BAI, CJI, CLL, CWK, CXD, DLP, DTJ, EUA, FLD, FNE, GFG, GSJ, HAZ, HO, JB, KHA, KTF, LV, LYH, NIY, NVB, NVD, PFB, RQI, RUK, TUK, UAP, VIJ, VNJ, VWK, WCE, WH, YAU.

W3's: ADE, APQ, BFF, BHK, BIP, CLI, CUL, ELI, EUG, GGF, GJY, IEF, JAK, JYS, KIP, LCB, LGK, LYN, LZM, MCG, NCE, NCJ, NHI, OFO, OPM, OYR, PTZ, PWH, QCB, QDH, QIR, QV, RMU, SEI, UF, UX VR.

W4's: CH, CVO, EEP, FJ, IG, IZG, GGD, JBV, KFT, KHZ, KTE, LRI, LYV, MWX, OAF, OWH, PUK, PPJ, QCC, RQV, SDR, SGS, SR.

W5's: AHT, BAM, BCF, EGX, ENE, FXN, HBZ, JPC, KUC, KZK, LF, NBS, NIY, OFH, OIA, OTH, PYU, RH, RKB, RWJ, SLC, SPH, SPM, ZU.

W6's: AOA, BHG, BSP, CGJ, DDE, DPF, DSY, DTY, FCN, FYW, GCD, GQY, GSX, HIK, KIE, KPU, LS, MMG, MVF, NHA, NJJ, NQI, NSK, TZD, YLM, ZLO, ZOL.

W7's: BA, BJY, BVZ, CO, CZY, EBS, FIX, FLB, FOS, HKV, HLU, HRM, IM, JU, MQ, NMJ, MWH, OZR.

W8's: ANJ, AQ, ARO, BKM, BPU, CLT, FLA, LX, QC, RN, SDD, SRU, TPN, UFA, VUK, WVL, WW, YCP, YPR, ZQL, ZUI, ZWM.

W9's: AKP, BEQ, CFP, ERW, EWC, GRW, HDB, HID, BWZ, HVP, IYN, JTX, JTY, KTX, LEF, NHA, OLU, OUR, RLB, SUF, TT, VUD.

WØ's: BHA, CJS, DDF, HOC, KXL, NIY, PTG, QVA, RRN, UBB, YBV.

KH6's: AAO, DL, FX.

KM6AT

KP4's: DU, DV, IQ, KF.

KV4AA
VE's: 1MK, 1VJ, 3IA, 7NK.
VO6VB

Allan J. Bakas, David P. Baker, William F. Bates, William J. Beetham, Gene C. Berck, Fred W. Blas, Jack W. Brasher, John W. Brumit, Frederick G. Calvert, Robert Casale, James J. Kramer, Gibbs B. Dixon, William G. Donberger, Harold B. Doten, W. R. Dunn, Stanley J. Dvorak, Frank A. Dzieciolowski, Roy E. Eyler, Harry Farber, J. J. Finnegan, John L. Harris, Harvey L. Haysler, Henry F. Horvath, John R. Joplin, Robert A. Kaschenbach, Herbert R. Knowlton, William C. Lewis, Theodor C. Lindquist, William B. Longval, Raymond J. Miller, Grover E. Mitchell, Jr., W. L. Mitchell, Gerald D. Mott, Irving C. Pahl, Leroy F. Potter, Loren J. Northup, Walter E. Richardson, Jr., R. B. Shanok, Alger M. Smith, John Sucher,

C. E. Van Pelt, W4LRI.

Richard L. Utley, P. C. Valenti, W. R. Wilson, Woodrow Wilson, R. A. Wood, Charles Zaug.

Military-to-Amateur Test

A special feature of the 1951 Armed Forces Day activities was a period devoted to test QSO's between radio amateurs and the headquarters stations of the Army, Navy, and Air Force. Operating on preannounced military frequencies, AIR, NSS, and WAR worked amateurs in the 3.5-, 7-, and 14-Mc. bands. The three military stations made a total of 895 QSO's with 504 amateur stations. Some amateurs worked the military stations on more than one band. Contacts with all three stations were made by 127 amateurs. Both AIR and NSS were worked by 53 amateurs; both AIR and WAR by 16; and both NSS and WAR by 20. W3MSK worked all three stations on all frequency bands! All operation, as worked, was between 1800 and 2400 EST. Special Armed Forces Day QSL cards have been sent to all stations worked by AIR, NSS, and WAR.

AIR

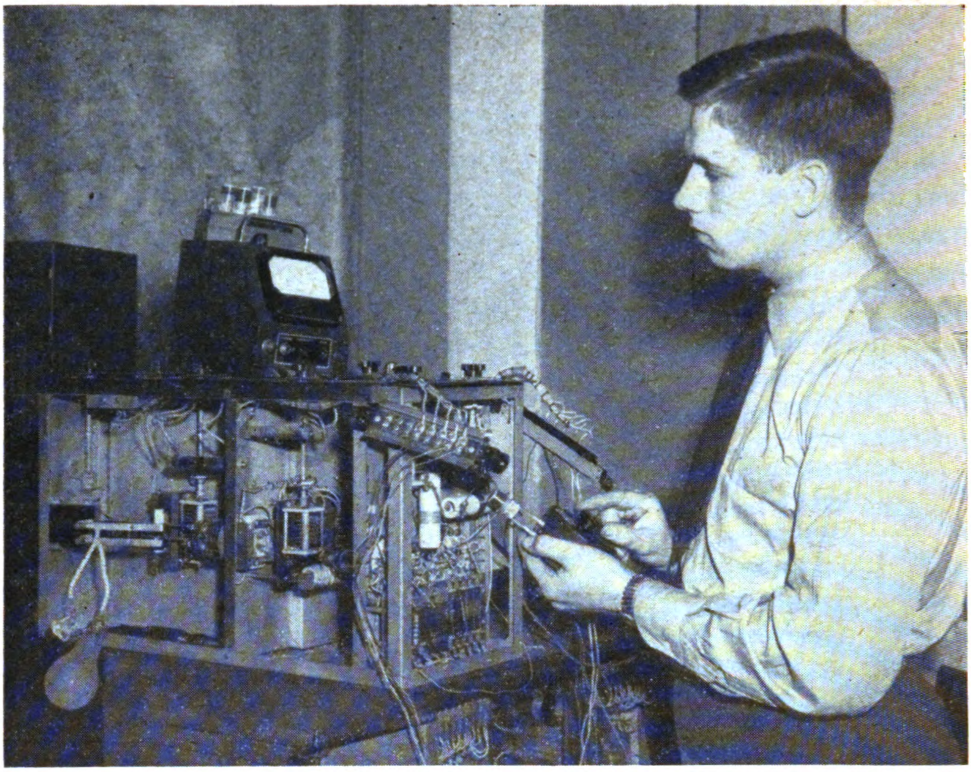
AIR operated simultaneously on 3497.5 (A1), 7635 (A1) and 14,405 (A3) kc., working amateurs in the 3.5-, 7-, and 14-Mc. bands respectively. Operators were W1QYY, Thomas Greenhalgh, Pfc, USAF; W4OAF, Harry Barrett, Sgt, USAF; W4OWH, Ira W. Matteson, T/Sgt, USAF; W9CSK, Norman K. Hester, Pfc, USAF; W9FJL, Richard Fisher, Pfc, USAF; W9QHK, Lawrence Rudolph, Pfc, USAF; and W0BCH, John Kennelly, Pfc, USAF.

AIR made 319 contacts (166 on 3.5 Mc., 86 on 7 Mc., 67 on 14 Mc.) with 305 amateurs. W3MSK was worked on all bands. The following were worked on two bands: (3.5 and 7 Mc.) W1's AQE, BOD; W2KTF; W3's KQH, PWN; W5NIY; W8AJW, KS. (3.5 and 14 Mc.) W3CLY, W4CKB. (7 and 14 Mc.) W5's QMJ, RWM.

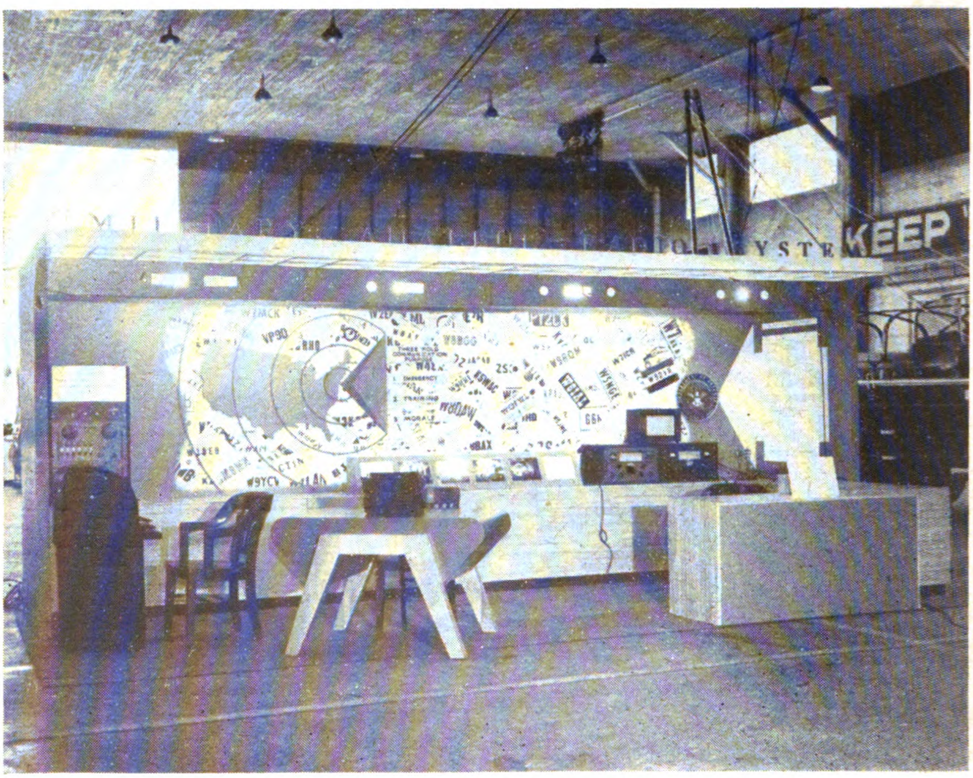
NSS

NSS operated simultaneously on 3415 (A1) and 7375 (A1) kc., working amateurs in the 3.5- and 7-Mc. bands respectively. Operators were W3EUG, C. W. Rickley, RMC, USN; W3MGG, LCDR K. R. Medrow, USNR; W3MSU, Ethel M. Smith, RMN3, USNR; W3SGO, LCDR F. G. Duncan, USN; W4IA, CDR. E. L. Battey, USNR; W4KMG, LTCOL L. W. Sieck, AFUS; W4LRI, C. E. Van Pelt, RMN1, USNR; W4LW, CAPT R. R. Hay, USN; LTJG H. V. McVay, USN; and M. E. Naumann, RMC, USN.

NSS made 281 contacts (141 on 3.5 Mc., 140 on 7 Mc.) with 263 amateurs. The following were worked on both bands: W1's ADC AQE BOD RHU; W2's KTF OXL PF; W3's CLY KQH MSK PWN; W4NQV, K4WAR; W5NIY; W8AJW; W9's BUK, IYN, and K9FAJ.



Pvt. Kieth Hester, AF9SCK.



MARS Exhibit, Bolling AFB, Armed Forces Day.

WAR operated simultaneously on 4020 (A3), 6997.5 (A1) and 13,947.5 (A1) kc., working amateurs in the 3.5-, 7-, and 14-Mc. bands respectively. Operators were W4RGF, Allen C. Slaight, SFC, USA; W0BYU, Raymond L. McSherry, Pvt, USA; W0WJA, Thomas A. Kalogerson, Pvt, USA; and W0YPA, Frank Stoll, Sgt, USA.

WAR made 295 contacts (78 on 3.5 Mc., 183 on 7 Mc., 34 on 14 Mc.) with 278 amateurs. W3MSK was worked on all bands. The following were worked on two bands: (3.5 and 7 Mc.) W1's AQE ODW; W2's PF, WDP; W3's BFF CLY KEW; W4's EEP RPZ, K4WAR; W8's AJW LBI. (7 and 14 Mc.) W5NIY; W6GEB; KV4AA.

FREQUENCY METER

A development model Frequency Meter has been received for test from Lavoie Laboratories, Morganville, N. J. This model incorporates a film presentation system as an integral part of the frequency meter and eliminates a calibration book normally supplied with each equipment. The meter covers the frequency range 100 to 500 mc with an accuracy of 0.001%. The calibration information furnished on the film system is direct reading, eliminating any need for interpretation while still maintaining 0.001% accuracy over the frequency range. The data contained on 24 inches of 35 mm film is equivalent to the data which could be closely typed on a single sheet of paper 42 inches wide by 85 feet long.

DON'T OVERLOOK THE BC–457!

Lt. Colonel Eugene M. Link AØIA

There are amateurs, owners of expensive transmitters using high-class vfo equipment, who have joined the MARS in good faith only to discover that the specialized design of their factory-made equipment prevents their operation on the 4-mc frequencies used by the MARS nets to which they have been assigned. This causes them embarrassment and their nets are deprived of the participation of interested members.

Two solutions suggest themselves. The first is to undertake to modify the tuning range of the existing transmitter—an operation which the average owner is reluctant to perform, since it would tend to depreciate the value of his equipment. The other is to acquire a separate transmitter especially for use on MARS net frequencies.

To those MARSmen planning a second transmitter, the writer recommends the BC–457. To date this has been the least costly of the SCR–274 (ARC–5) series, and needs no frequency conversion for MARS use since its normal tuning range is from 4.0 to 5.3 megacycles. Circuit conversion for a-c line operation requires little previous knowledge of the unit, and may be accomplished in an hour or two.

As used at this station, the BC–457 modification includes a specially planned power supply and a separate operating control box. The power supply as shown in figure 1 provides regulated oscillator plate and p. a. screen voltage, in the interest of stable operation and clean keying. A special feature of this power supply is the use of a 24-volt transformer which eliminates the need for rewiring the heaters, and which allows for use of 24-volt d. c. for operating the keying relay.

The initial step in the BC–457 conversion is the matter of the antenna relay. This relay is too slow acting to be useful, so it should be removed from the chassis and discarded. To accomplish this, remove the two screws holding the relay to the inside of the front panel, lift out the relay and clip off the black and white connecting leads just above the chassis. When the relay is removed a spiral relay contactor spring will remain attached to the panel assembly. Move this contactor so that it rests firmly on the antenna binding post screw. Following this, drill a small hole in the front

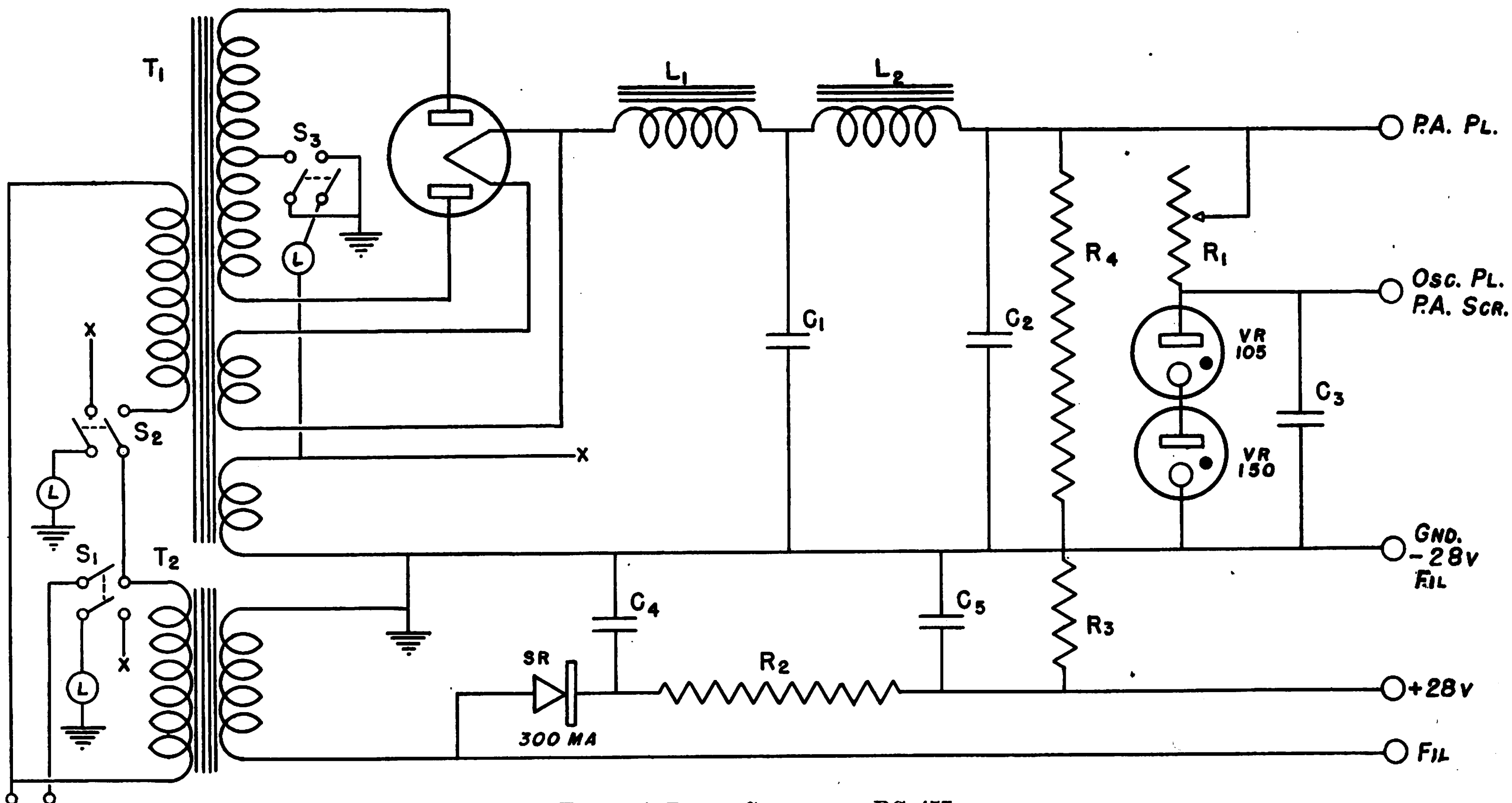


FIGURE 1. POWER SUPPLY FOR BC-457.

panel to the left of the antenna binding post and mount a second binding post to serve as a ground connection.

The rotary antenna tuning inductor may be removed or left in the unit at the option of the convertor. The writer chose to retain this coil against the time when he might need it for use with a single wire antenna worked against ground. In the AØIA conversion the inductance of the antenna coil was run down to a minimum, and left unused. R-f output is taken by link coupling, using the single-turn variable link within the p. a. tank inductor. If a 300-ohm line is used with this link, it will be necessary to add four turns of wire in series with the single-turn link. These additional turns should be of solid-conductor, well-insulated wire, wound around the bottom of the p. a. coil form. The variable turn will allow some latitude in loading the p. a.

With this accomplished, the bottom cover plate of the chassis is removed. Inspect the power receptacle at the rear of the chassis to see which of the figure 2 "Before" diagrams it matches. You may either use this receptacle as is, soldering your power cable leads to its contacts outside the chassis, or you may remove it and substitute another receptacle for which a standard plug is available.

If you prefer to install a standard male chassis receptacle, use one with six contacts and connect wires from pins No. 6 and No. 7 on the old chassis socket to pins No. 5 and No. 6 of the new chassis receptacle. The other wires are connected to the correspondingly numbered pins.

Having decided the matter of the chassis power receptacle, perform and check the following operations:

1. Remove from the chassis completely the *black* wire connected to pin No. 2 of the power receptacle;
2. Remove the *black* wire from pin No. 5 of the same receptacle and reconnect it to pin No. 1, in addition to the wire already attached to pin No. 1.

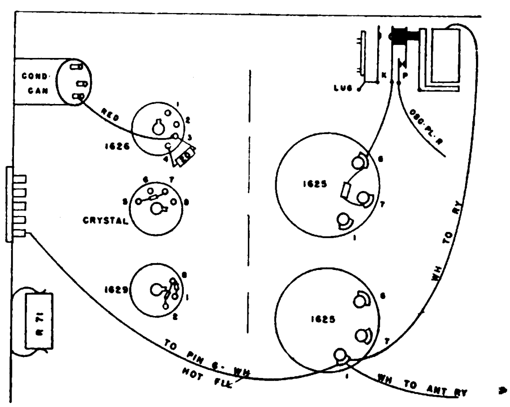


FIGURE 2. UNDER CHASSIS VIEW BEFORE CONVERSION.

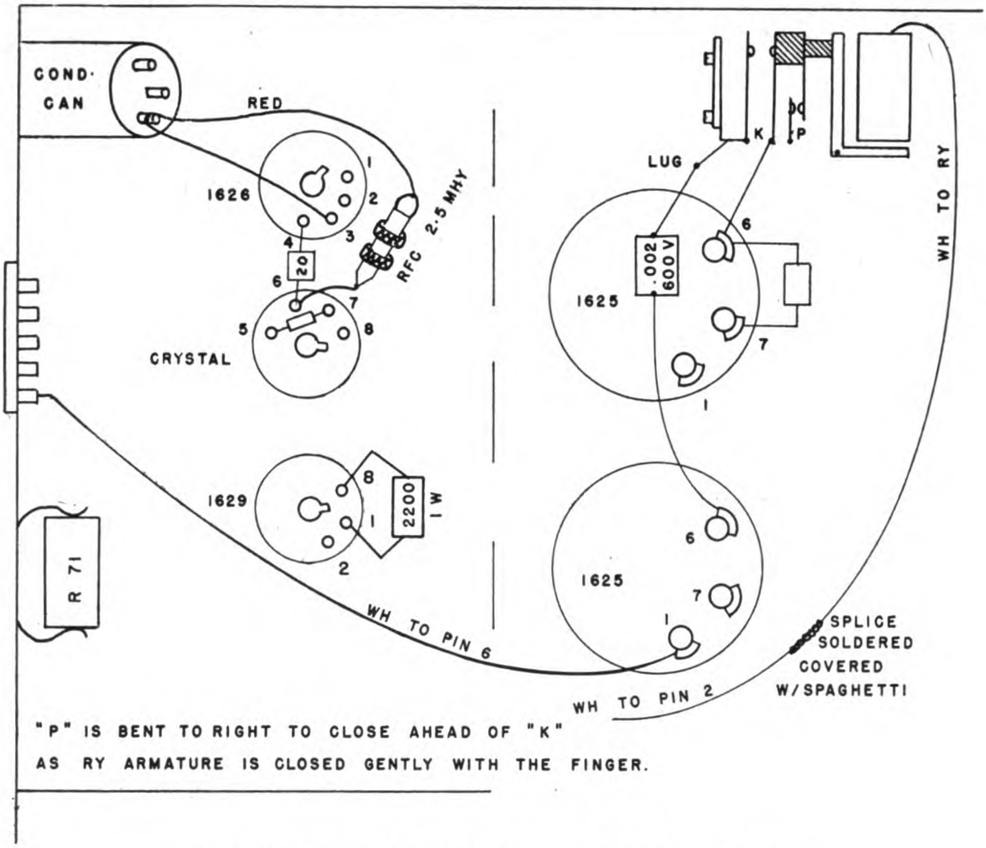


FIGURE 3. UNDER CHASSIS VIEW AFTER CONVERSION.

3. Remove the two right-hand wires connected to pin No. 1 of the "lower" 1625 socket. Solder them together and insulate the joint. One of these wires goes to the keying relay; the other went to the antenna relay.

4. Pull the severed wires from the antenna relay down through the chassis holes. Disconnect the *black* wire or discard it. Dress the *white* wire along the inner side of the chassis to the power receptacle and connect it to pin No. 2.

5. Check your socket connections with the "after" diagram of figure.

Proceeding with the under chassis circuit changes, connect a 0.002 microfarad, 600-volt cathode bypass capacitor from pin No. 6 of the "lower" 1625 socket to the unused lug on the keying relay, as shown in Figure 3. This capacitor may be a molded paper one, but a mica capacitor is to be preferred.

Study closely the diagrams of the three tube sockets and other elements at the rear of the chassis (see figs. 3 and 4). Remove one end of the 20-ohm resistor from pin No. 3 of the 1626 oscillator socket, and reconnect it to unused pin No. 6 of the crystal socket. To this same pin No. 6 connect one end of a 2.5 millihenry, 100 milliampere

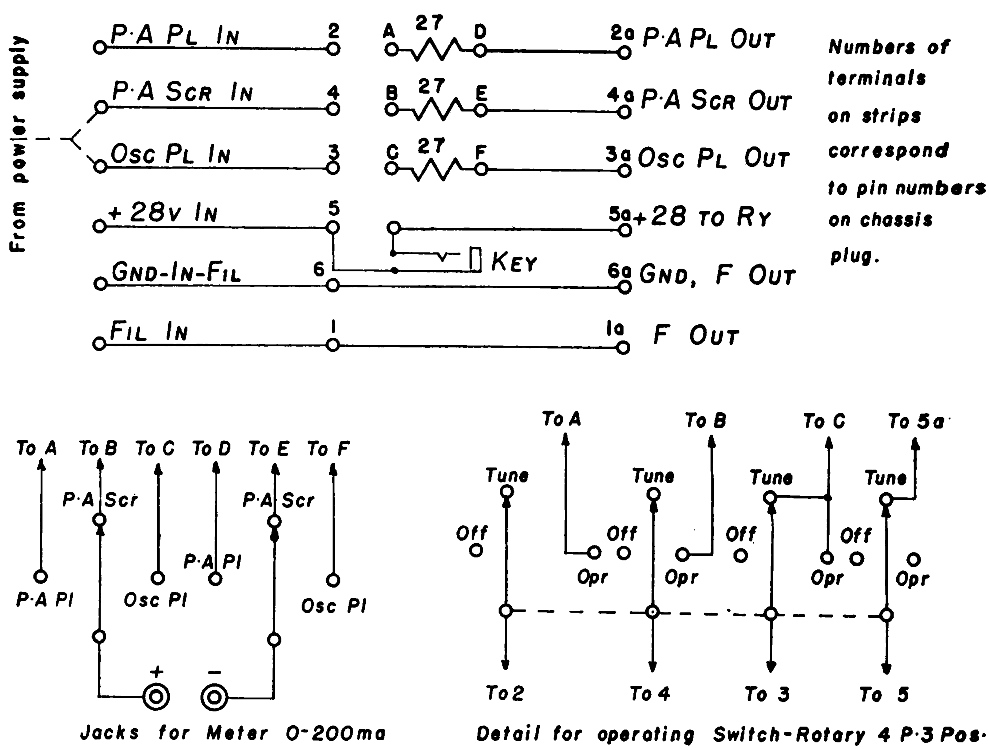


FIGURE 4. CONTROL BOX FOR CONVERTED BC–457.

r-f choke. The other end of the r-f choke connects to the left-hand terminal of the cam capacitor mounted on the rear chassis wall. Dress the r-f choke in a vertical position with maximum clearance from other connections and components.

Continue to the 1629 indicator tube socket. Remove and discard the two small resistors connected between pins No. 1, No. 2, and No. 3. Do not disturb any other connections to these pins. Connect a 2200-ohm, 1-watt resistor between pin No. 1 and pin No. 8 (it may be found necessary to remove resistor R71 temporarily from its clip mounting while doing this job).

This completes the actual conversion. Before replacing the covers on the transmitter, locate the short contact springs ("P" in figure 3) and bend them slightly together so that the contacts will close just before the contacts at "K." This starts the oscillator ahead of the p. a. and tends to reduce chirps and clicks.

The power supply for the converted BS–457 is shown in figure 1. It comprises a source of unregulated high-voltage d. c. for the p. a. plates; regulated 255-volt d. c. for the oscillator plate and p. a. screens; 24-volt a. c. for the tube heaters; and 24-volt d. c. for the keying relay. Double-pole, single-throw toggle switches with associated 6.3-volt pilot lamps are included to afford control and indication for the filament power, plate power, and operate-standby functions. The latter

toggle switch and indicator may be left out of the power supply assembly if the AØIA control box scheme is used.

The only adjustment required for the power supply is the setting of the current limiting resistor in the VR branch. This rheostat should be adjusted under key-down conditions so that the VR tubes will draw five milliamperes, measured, or will maintain a very faint glow. With key up the VR tubes should draw no more than their rated maximum current.

Power Supply Parts List

T1	Power Transformer	Primary: 110–120 V a. c.; 60 cycles. Secondary #1: 800 to 1200 V CT; 200 ma. Secondary #2: 5 volts at 3 amperes. Secondary #3: 6.3 volts at 3 amperes.
T2	Filament Transformer	Primary: 110–120 V a. c.; 60 cycles. Secondary: 24 volts at 3 amperes.
C1 C2	HV Filter Capacitors	4 mfd; 600 volts; oil-filled.
C3	Buffer Capacitor	4 to 8 mfd; 450 volts; electrolytic.
C4 C5	LV Filter Capacitors	40 mfd; 150 volts; electrolytic.
*L1	Swinging Choke	4 to 10 henrys; 200 milliamperes.
L2	Smoothing Choke	10 henrys; 200 milliamperes.
R1	Limiting Resistor	10,000 ohms; 50 watts; rheostat.
R2	LV Filter Resistor	50 ohms; 10 watts.
R3	LV Bleeder Resistor	6800 ohms; 2 watts.
R4	HV Bleeder Resistor	50,000 ohms; 10 watts.
--	LV Rectifier	Selenium; 300 milliamperes; 36 volts.
--	HV Rectifier	Tube; 5R4GY.

*The swinging choke need not be used if the r. m. s. voltage per plate of the 5R4GY does not exceed 450 volts.

The control box scheme diagrammed in figure 4 is well worth using. At AØIA it is used to enable adjustment of the vfo to zero beat with signals in the receiver without swishing a strong signal across the band. Provision for this mode of operation was built into the control box. A four-pole, three-position rotary switch is used for the purpose, which affords the following control functions:

1. *Standby:* heaters on; all h. v. off
2. *Tune:* heaters and oscillators on; p. a. off
3. *Operate:* all voltages applied for normal operation

The control box is a 4- by 6-inch unit which contains, in addition to the control switch mentioned above a two-pole, three-position meter switch, pin-tip jacks for connecting a milliammeter, meter shunt resistors and a key jack. Internal connections are made to six-contact terminal strips as illustrated in figure 5. The meter used with this particular installation is a Weston 0–200 milliammeter, with which 27-ohm shunts are used to read p. a. plate, p. a. screen and oscillator plate currents. Other meters may require shunts of different values.

The conversion described above involves a minimum of expense and labor, and has been planned so that no intimate knowledge of the circuits is involved. Anyone can make the conversion who is able to read a simple diagram. So, get busy, fellows: I'll see you on MARS!

The KH6USA mobile unit as it appeared during a recent Hawaii MARS Field Day.

A RADIO PATCH SYSTEM

by David Talley A2PF
Lt. Col., Signal Corps, USAR

The use of radio-wire line connections for MARS and other emergency communications networks was first discussed in the April 1950 issue of the MARS BULLETIN. Circuits and apparatus were shown which provided for patching a four-wire radio circuit to the usual two-wire telephone line connection. Means for both simplex (manual "push-to-talk") and full duplex operation were discussed.

It is the purpose of this article to show a simple method of patching together two radio circuits as a suggestion for the further extension of MARS net operations. This may be termed a "radio patch." The use of this system permits the interconnection of two phone nets working on different frequencies. For example, a MARS net operating on 27,994.0 kcs may be connected to another net working on 4020.0 kcs through their respective net control stations. This means that a VHF net, primarily organized for local communications, may extend its range by being patched to an HF circuit that works, say, on the 2 mc or the 4 mc band. A long-distance outlet can thus be provided in the same manner as a local telephone exchange is connected to a toll line for calls to distant cities.

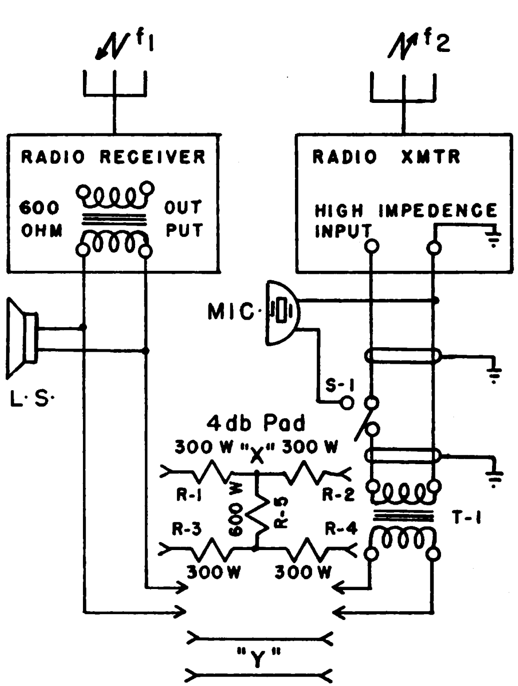
Simplex and Full Duplex Operations

MARS phone stations, in common with the majority of amateur phone stations, comprise but one radio transmitter and receiver. This provides a one-way facility in that the operator may either receive or transmit, but can not do both simultaneously. He has to switch from receiving to transmitting and back again—"push-to-talk"—the same as most military tactical radio sets. This is called the simplex method.

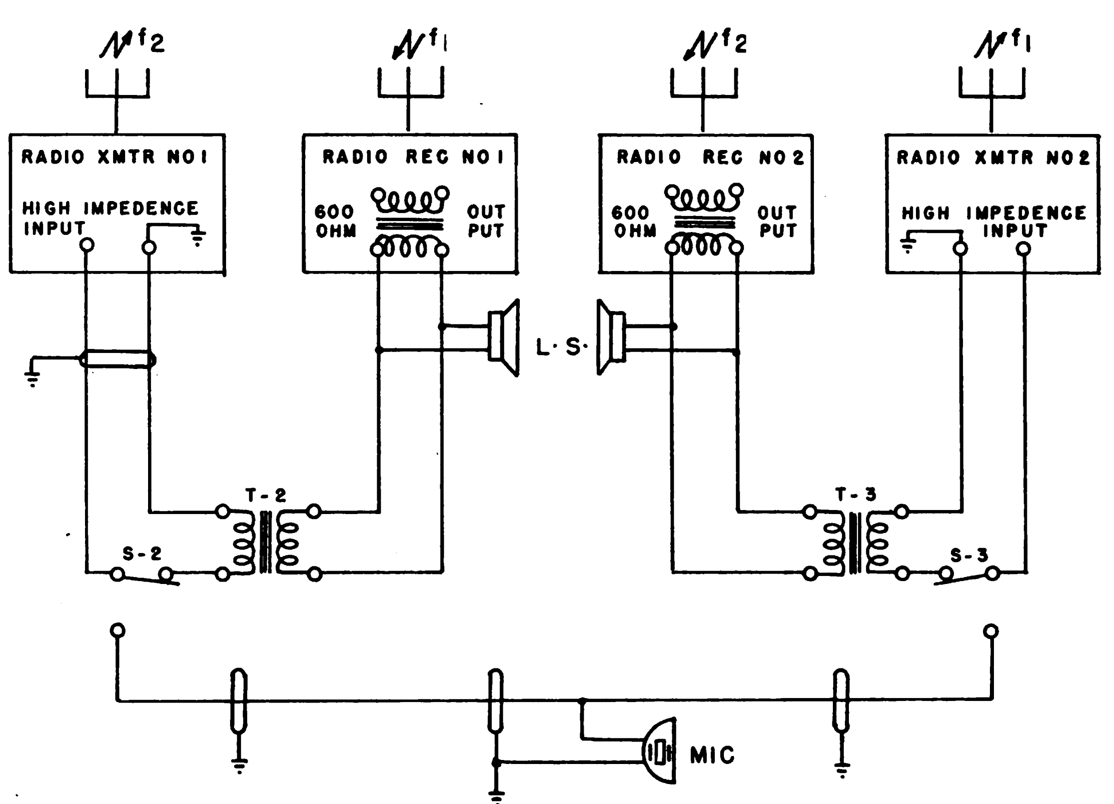
When we use the land telephone, we can hear and talk to the other party simultaneously because there is an established connection available in each direction. This method is termed the full duplex circuit. Many VHF and microwave radio links now provide similar facilities on a four-wire basis.

Functions of Net Control Stations

In military nets, the control station of one net also serves as a subordinate station in the next higher echelon net. Two radio stations usually are required, one for the assigned frequency of the net for



ONE WAY "RADIO PATCH" CIRCUIT WITH LOCAL CONTROL



TWO WAY "RADIO PATCH" CIRCUIT FOR RELAY STATION OPERATION WITH LOCAL CONTROL

FIGURE 1.

which it is NCS, and the other for operating on the frequency of the net of which it is a subordinate unit. In this article, means will be described for combining operations in such manner as to minimize equipment requirements while permitting any subordinate station in a net to be connected through to another net via the radio patch at the net control station.

For radio patch operations, the net control station or other station making the "patch" acts as a radio relay station. The method of operation to be employed will depend upon the radio receiving gear available at the subordinate net stations. If, for example, all or most of the subordinate net stations are equipped with receivers to cover both VHF and HF bands, the VHF net control station need only to patch his VHF receiver output to the input of his HF transmitter to afford a one-way radio patch. Otherwise, separate receivers and transmitters for the VHF and HF bands, respectively, would be needed at the net control station.

One-Way Radio Patch

The simplest form of radio relay arrangement is the one-way radio patch circuit as illustrated in figure 1. This plan presupposes that each net station has receiving equipment to receive the distant station of the other net. The net control station, in this case, serves as a one-way radio relay station. This may be illustrated by the following example:

Let us assume that Net Able operates on 27,994.0 kcs in the VHF band and that a tie-in is desired with Net Baker which works on 4020.0 kcs in the HF band. The net control station of Net Able first would establish communications with the net control station of Net Baker on 4020.0 kcs. Then the Able Net NCS would patch his 27,994.0 kcs (f_1) receiver output to the input of his 4020.0 kcs (f_2) transmitter as shown in figure 1. Since each station in Net Able can also receive on 4020.0 kcs, the Net Baker NCS can now communicate directly with stations in Net Able. Signals from Net Able stations will be relayed through the net control station of Net Able on the 4020.0 kcs frequency of Net Baker. Whether or not push-to-talk control is required at Net Able NCS will depend upon the type of radio equipment used, shielding of the equipment, antenna separation, et cetera. In most cases, it is believed, the net control station will switch manually from transmitting to receiving and vice versa as required. In any case, the transmission of the radio-relay transmitter must be monitored by a qualified operator. (See Ed. Note)

Two-Way Radio Patch

Where subordinate net stations do not have equipment suitable for receiving on different frequency bands, or their locations or other factors preclude such operations, it will be necessary for the net control station to employ the two-way radio patch circuit as shown

in figure 2. This requires separate radio receivers and transmitters for each net frequency or band used. Referring to the example given above for the one-way phone patch case, we will have the following situation at net control station Able: radio receiver No. 1 will receive on 27,994.0 kcs (f_1) from MARS stations in Net Able. The output of this receiver is fed directly as shown to transmitter No. 1 which operates on 4020.0 kcs (f_2) Receiver No. 2 is tuned to 4020.0 kcs (f_2) to receive net control station Baker. The output of receiver No. 2 is connected to the input of transmitter No. 2 which is on 27,994.0 kcs (f_1), the frequency of Able Net. The operator at net control station Able is free at all times to monitor both frequencies and to talk on either transmitter No. 1 (4020.0 kcs) or transmitter No. 2 (27,994.0 kcs), as required. By throwing the proper switches, he can arrange his equipment as a radio relay station to furnish a two-way radio patch. It may be necessary to utilize local control for push-to-talk or simplex switching unless there is adequate separation of antennas and radio gear to permit full duplex operations.

The operator at the net control station serving as a radio patch would have to switch his transmitters' carriers on and off in accordance with the received signals. He will have to be on his guard against lockouts, a condition that exists when the transmitters at both ends of the circuit are energized at the same time. Since the receivers are disabled while the transmitters are turned on, each party is unaware that the other is talking. This situation may arise when there is doubt on the part of one station as to whether or not the other station has completed his transmission.

Applications of the Radio Patch

There are many applications for the radio patch method of operation in MARS activities, particularly with the present expansion of MARS membership to include civilian radio amateurs. Many nets for Civil Defense probably will use the VHF 2-, 6-, and 10-meter bands. Their normal operations will, of necessity, be limited to the territory of their town or community. For long distance communications, as to the State Capital, Army Area Headquarters, or to Washington, D. C., and so forth, it will be necessary to employ the medium HF band (3 to 30 mc). These facilities may be made available through the net control station using the radio patch circuits explained in this paper.

(*Ed. Note: When employing the "radio patch" scheme a radio operator must be in constant attendance at the relay station, even though full duplex operation is achieved. Care must be taken to insure that an unmodulated carrier is not allowed to remain on the air, and the call letters of the relaying station must be transmitted at intervals as specified by applicable regulations.*)

CUT AND TRY

EXTENDING COLLINS 32V–2 TUNING RANGE FOR MARS 4025 KC

MARS members who have 32V–2 transmitters or similar Collins Radio Company equipment have been frustrated by not being able to operate their fine equipment on the MARS 4020 and 4025 kcs net frequencies to which they were assigned. The PTO and its nice calibrated dial go just slightly beyond 4mc, and no more.

For those MARSmen who are owners of Collins PTO-equipped transmitters and anxious to use their gear for MARS net operations, Dave Talley A2PF has prepared a modification procedure. Says A2PF, "It is possible to make these transmitters tune to 4025 kcs by a very simple expedient requiring only one screwdriver as a tool. The procedure is as follows: with the transmitter set on the 80-meter band, turn the PTO dial to 4,000 kcs. Lift up the cover of the 32V–2 and turn back the dial slowly until the set screw on the rear of the insulated flexible coupler is visible in the rectangular hole or slot between the two screws supporting the front of the PTO unit. This will probably be at dial reading 3968.5 kcs. Loosen this set screw fully and turn the dial slowly until the second set screw is visible in the slot. Loosen this set screw also and the PTO shaft should now be free from the insulated flexible coupler of the dial shaft.

"Now, turn the dial back exactly 20 kcs or to dial reading of 3948.5 kcs at which point the set screw should again be visible in the slot. Tighten this set screw and then turn the dial until the second one is visible. Tighten this one and the job is finished. It is not advisable to try to squeeze more than 20 to 25 kcs additional out of the PTO unit because of the danger of damage to the slug inside of the PTO if it is turned too much to the right.

"To gain these additional 20 to 25 kcs, we have to pay something in return—and this payment is made in the dial readings or calibration. Assume that we have added 20 kcs by the aforementioned method, our tuning dial will now read 20 kcs lower. For example, 3980 kcs on the dial is actually 4000 kcs in freuency. Since harmonics of the PTO are used in the other amateur bands, we will have the following relations:

(1) For the 80-meter band, the frequency will be 20 kcs higher than the dial reading;

A 4-mc Crystal Oscillator for 32V– Transmitters

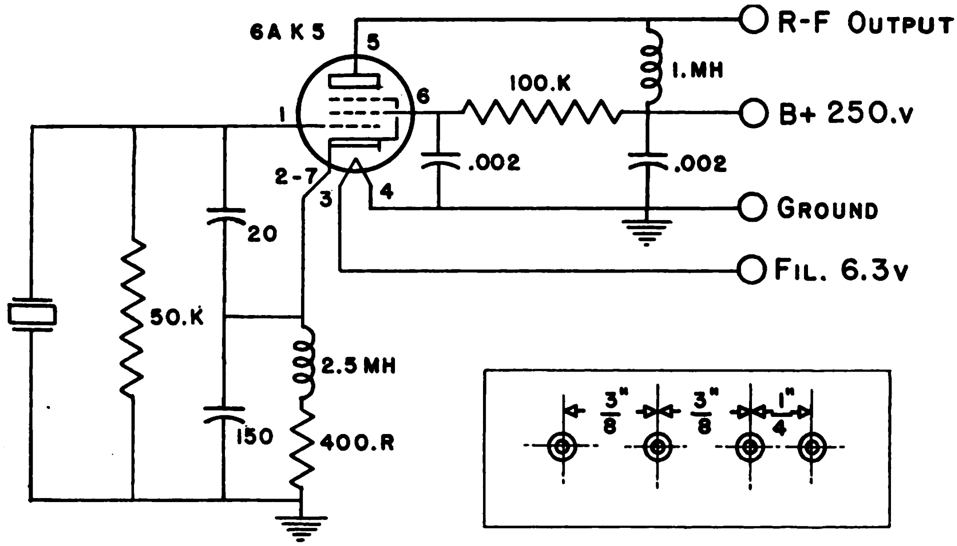


FIGURE 1. SCHEMATIC OF PLUG-IN CRYSTAL OSCILLATOR.

(2) For the 40-meter band, the frequency will be 40 kcs higher than the dial reading;

(3) For the 20-meter band, the frequency will be 80 kcs higher than the dial reading; and,

(4) For the 10-meter band, the frequency will be 160 kcs higher than the dial reading.

"The 32V–2 at A2PF was changed as described above and tests were made on the 3500–4000 kcs, 7000–7300 kcs, 14,000–14,300 kcs and 28,000–29,500 kcs ranges without any discernible change in output or operation as compared to performances previous to this modification. Due credit should be given to A2LRW who was one of the first MARS stations to modify a 32V–1 Collins transmitter for operations up to 4025 kcs."

Owners of 32V–1 and 32V–2 transmitters have found themselves stymied when they have been assigned to nets working on one of the MARS "4-mc" frequencies. Their transmitters are not built to tune above 4000 kilocycles.

From Fourth Army has come an idea for a crystal oscillator that will replace the PTO to permit crystal operation on the MARS channels between 4000 and 4085 kcs. Shown schematically in figure 1, it is a modified Pierce oscillator which has been recommended by the Collins Manufacturing Company for use with their 32V–1, 32V–2 and other Collins exciters using the 70E–8 oscillator, to replace the PTO to permit crystal operation on the MARS "4-mc" channels. The buffer stages are broad enough to give sufficient grid drive and calibration is not affected. Colonel Carl H. Hatch, A5QVE, has had excellent results with this oscillator and recommends it for use by MARS members with Collins equipment using the 70E–8 PTO.

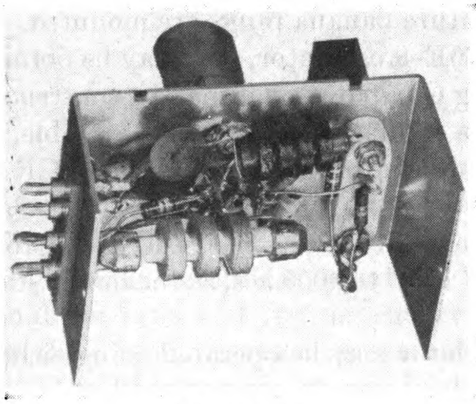


Figure 2.

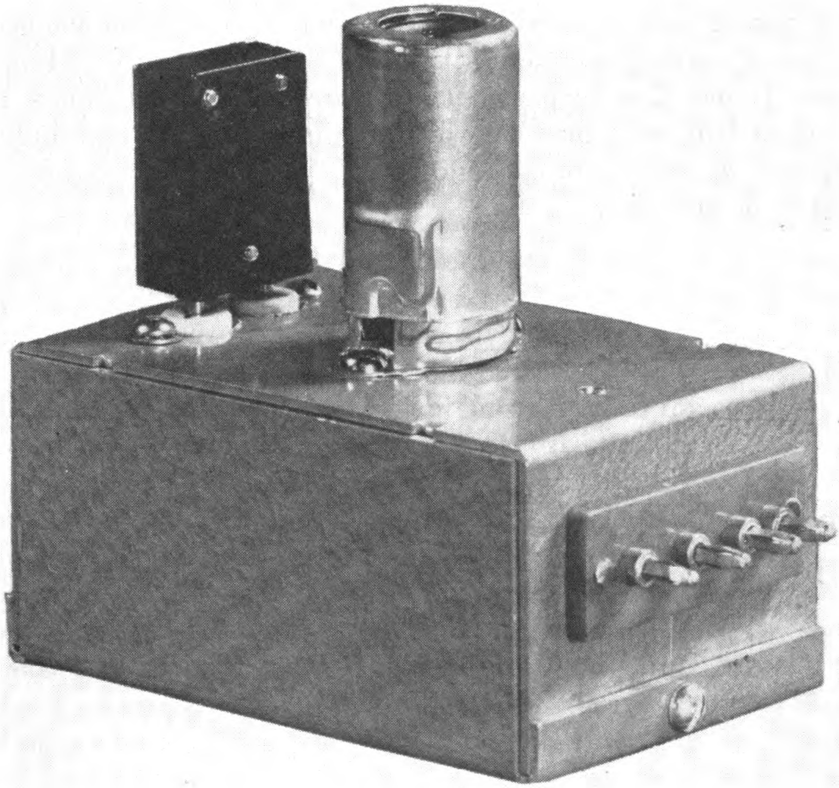


Figure 3.

The pictures, figures 2 and 3, show an assembled oscillator. The oscillator is built in a 3¼″ x 2⅛″ x 1⅝″ metal box with tube and crystal exposed. All components are standard except the bakelite strip on which the miniature banana plugs are mounted. This strip is Part P001, part of the 70E–8 oscillator, and may be obtained from the Collins Manufacturing Company, or it may be constructed as specified on the diagram if the miniature plugs are available. These plugs are plentiful on surplus equipment such as the SCR–274–N racks and control heads.

When using the crystal oscillator it is necessary to tune the dial controlling the normal PTO to 4000 kcs, as the buffer stages also are tuned by this control.

The crystal oscillator may be operated using either fundamental or harmonic crystals.

HEAVY-DUTY VIBRATOR

The sample heavy-duty vibrator developed by P. R. Mallory & Co. under Signal Corps contract has surpassed the life test of 500 hours of continuous operation under full load of 300 watts with a 24-volt DC input. It has also surpassed the requirement of 300 hours on intermittent life test, consisting of one minute on and one minute off operation, at rated voltage and load. The vibrator is now being tested to destruction.

A BEAM SCHEME

When the gang at A5USA were setting up and tuning the MX-854/FR "roto-beam" antennas at their new station, they made the antenna adjustments using a simple scheme based upon the principle that the directional patterns and the impedance of an antenna are the same whether the antenna is used as a transmitting or as a receiving antenna. They liked the results obtained, and suggested that some information about the method be included in this issue of the BULLETIN.

Hitherto, amateurs have made final beam tuning adjustments by firing up the transmitter and tuning the antenna elements for maximum radiation as indicated by a field-strength meter. This method is time-honored and affords good results, but it is complex and sometimes tedious. It requires that an assistant be posted at the transmitter to maintain constant r-f output with changing antenna load during adjustments. To prevent r-f burns the transmitter must be shut down during each adjustment; then turned on again and reloaded for each field-strength meter reading. A means of communications must necessarily be maintained between the antenna adjustor, the transmitter attendant, and the field-strength meter reader. Despite the merit of this method, it requires a lot of time, additional personnel, and painstaking adjustments and readjustments.

The more simple process advocated by the A5USA crew takes advantage of the knowledge that an antenna adjusted for receiving purposes will function equally well for transmitting.

This scheme has been called *adjustment by reception* since the beam antenna is receiving signals continuously while the beam elements are undergoing their final tuning. The tuning process need not be interrupted by transmitter shut-down, since there is at no time sufficient r-f energy on the elements to cause burns. Figure 1 shows schematically the test set-up. A low power (10 to 50 watts) transmitter is used to drive an exciting dipole, with care exercised to aviod spurious radiation from the exciter transmitter or its transmission line. The exciting dipole must have the same polarization as the beam antenna, and be situated as nearly as possible at the same height. The two antennas must be separated from each other by not less than two wavelengths.

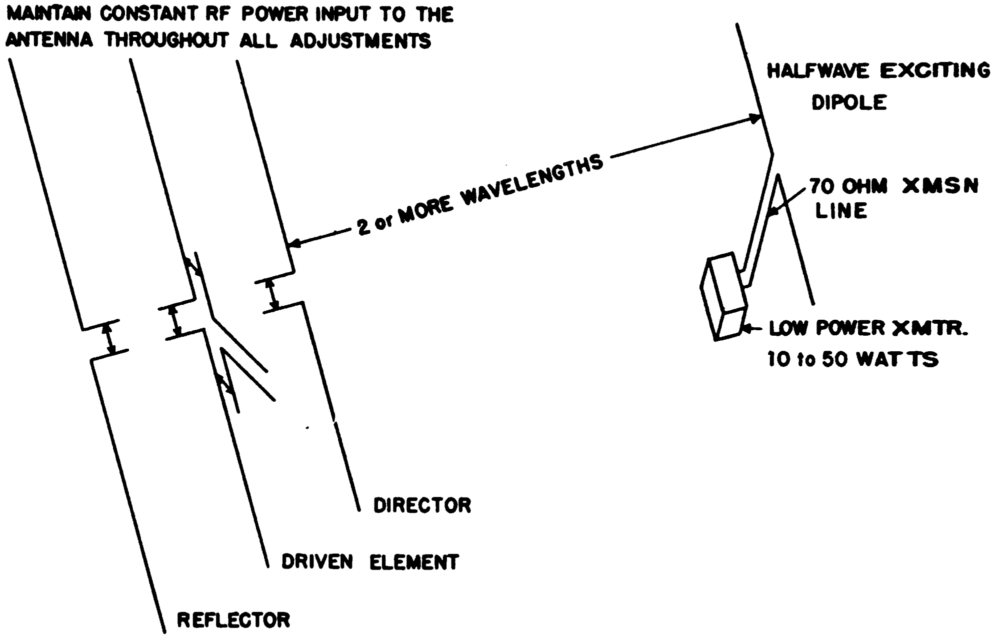


Figure 1. Method of Adjusting Three-Element Antenna and T-Matching Section as a Receiving Antenna.

With the exciting dipole sited and in operation, the beam antenna is prepared for final tuning by disconnecting its transmission line at the antenna terminals and substituting the load resistors of a signal level meter such as that shown in figure 2. An instrument of this sort was used by A5USA (except that they built it for a 300-ohm match) and they report good results.

The signal level meter circuit illustrated in figure 2 consists of a balanced 600-ohm load comprising two series-connected 300-ohm re-

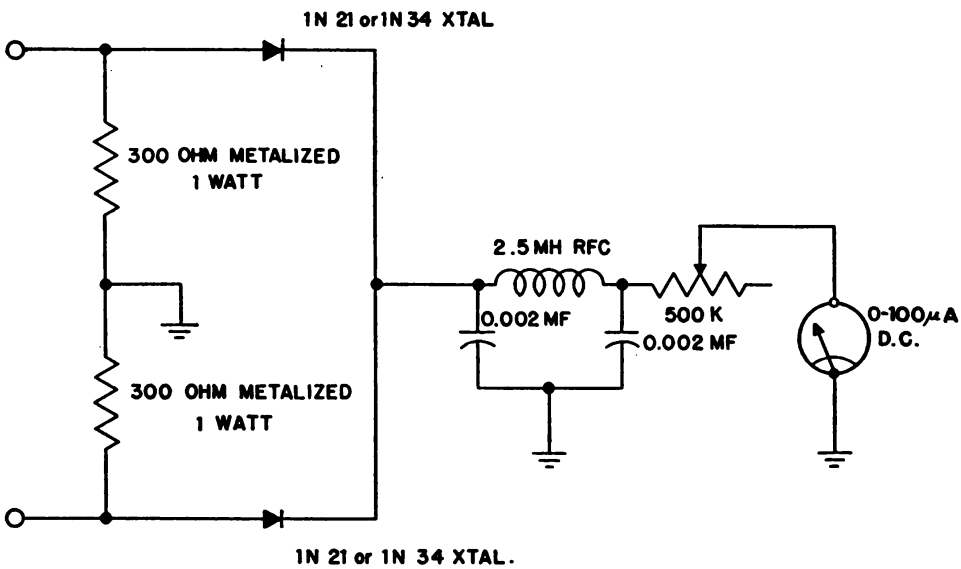


Figure 2. Signal Level Meter for Adjusting Antenna to Have Balanced Input of 600 Ohms.

sistors; a full-wave signal rectifier employing two crystal diodes (either 1N21 silicon or 1N34 germanium may be used); an r-f filter made up of a 2.5 millihenry choke and two 0.002 microfarad capacitors; a 500,000-ohm rheostat and a 0-100 microampere d-c meter.

In operation, a signal e. m. f. is developed across the load resistors that is proportional to the amount of received signal current in the antenna. This e. m. f. is rectified by the crystal diode full-wave circuit, and residual r-f remaining with the rectified direct current is removed by the r-f filter before reaching the d-c microammeter. The rheostat limits the amount of rectified direct current flowing through the microammeter and serves as a sensitivity control. Since relative values of radiofrequency e. m. f. are all that is required, the meter does not have to be calibrated in volts.

The entire signal level meter assembly must be mounted within a tight copper or aluminum box to shield the components from stray r-f fields. Clip leads may be used on the input terminals to facilitate connection to the terminals of the antenna.

Using as an example the 3-element "low-frequency" antenna of the MX-854/FR Antenna Kit whose elements have already been adjusted to length according to formula and are ready for final tuning, the procedure would be—

With the main transmission line disconnected, connect the input terminals of the signal level meter to the transmission line terminals at the base of the antenna rotator. Rotate the beam so that its director is the element closest to the exciting dipole. Adjust the T-matching section shorting bars, maintaining them equidistant to the center of the element, until a *maximum* meter reading is obtained. Next, adjust the driven element by means of its tuning stub until the meter rises to a new *maximum*; then adjust the director tuning stub for a further *maximum* meter reading.

Following this, rotate the beam through 180° so that the reflector is the element nearest the exciting dipole, and adjust the reflector by means of its tuning stub until a *minimum* meter reading is obtained.

When this has been done, rotate the beam to its original position and repeat each step of the tuning process, touching up each element until the antenna is adjusted to give optimum performance. Then, disconnect the signal level meter, reconnect the transmission line, and everything is set to go.

GRID BIAS SUPPLIES FOR R-F AMPLIFIERS

Grid bias sources for Class "C" radio frequency amplifiers present some interesting and varied problems to the transmitter designer and builder. A grid bias source is not required to deliver power to a load, but only to furnish a fixed negative grid potential to establish the operating point of the tube. However, current flows through the bias source and because of this some interesting results can be obtained. This paper will describe several methods of obtaining the bias for medium power r-f amplifiers.

The bias potential used in r-f amplifiers may be classified in two types—operating bias and protective bias. Operating bias is the value of potential used to establish optimum operating point of an r-f amplifier under a given set of conditions. Protective bias is potential applied to prevent excessive plate current and consequent tube damage when the r-f amplifier is not operating, i. e., when the grid is receiving no r-f excitation. Operating bias and protective bias may be obtained either from the same source, or from two separate sources working in combination with each other.

There are three basic methods for obtaining grid bias potential: (1) fixed; (2) gridleak bias; and (3) cathode bias. These three methods may be used individually or in combination with each other. Whatever the arrangment, a bias source should have a well filtered d-c output, since ripple e. m. f. may modulate the r-f carrier.

Ⓐ of figure 1 illustrates the fixed bias scheme. The bias source may be a battery, or a bias supply of suitable design affording both operating bias and protective bias. Battery bias is not extensively used at this time because of the large space required for the bias batteries and because they must be replaced periodically, with consequent recurring expense.

Ⓑ of figure 2 shows a gridleak bias circuit. Here, a suitable resistor is connected in lieu of the battery or bias supply. The flow of grid current through the grid resistor develops a voltage drop across the resistor, which gives the grid a negative bias with respect to the cathode.

The gridleak method of obtaining bias has the advantage of simplicity and automatically biasing the grid in proportion to the excitation voltage. Because of this action, the value of the grid bias resistor is not critical. However, this method furnishes operating bias only, and has the disadvantage of permitting excessive plate current to

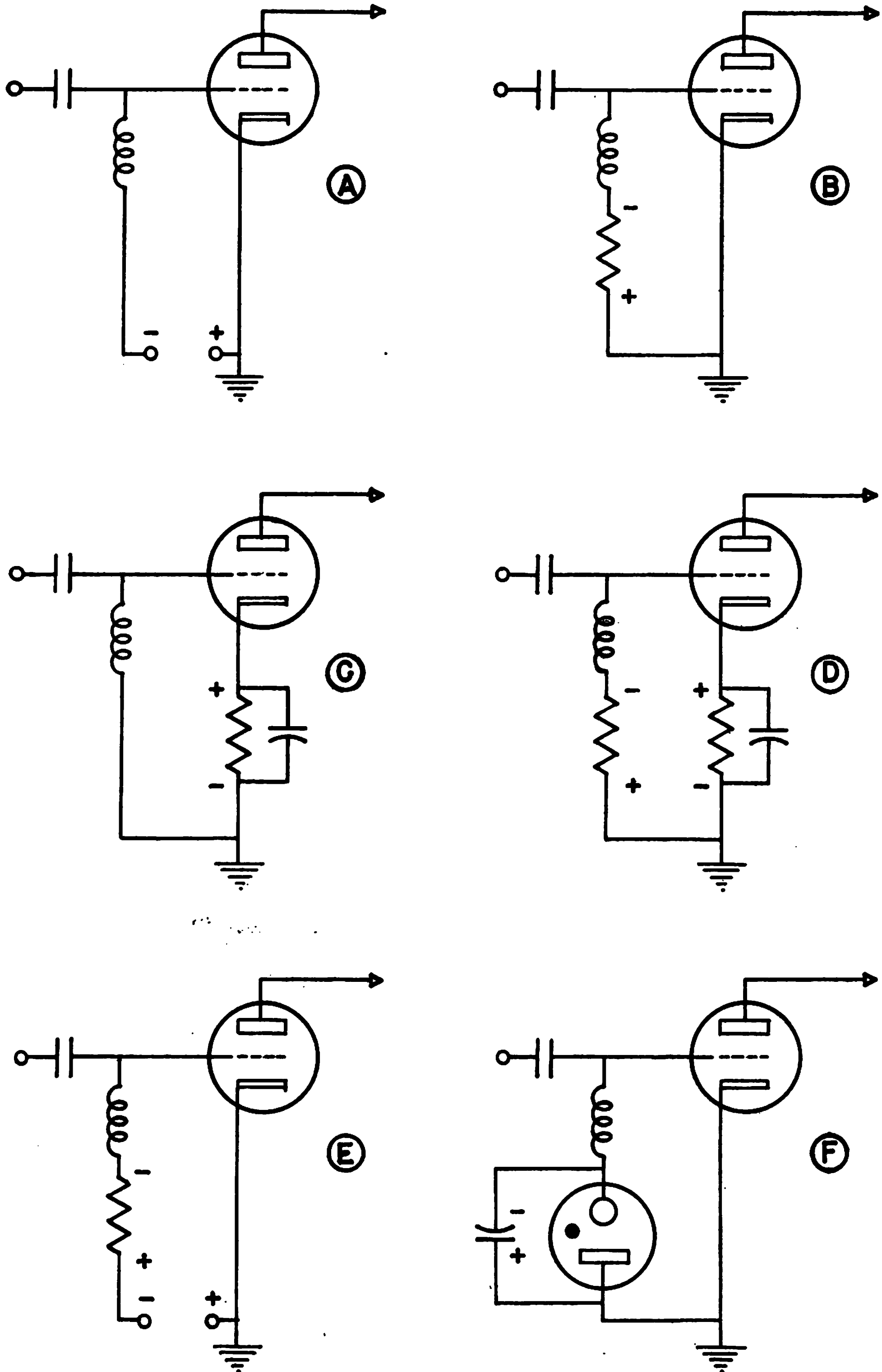


FIGURE 1.

flow in the r-f amplifier when excitation e. m. f. is removed, since loss of excitation will cause the grid bias to fall to zero. Some method of protection, therefore, must be employed.

Ⓒ of figure 1 shows the use of cathode bias. The cathode current flowing through this resistor builds up a voltage drop that makes the cathode positive with respect to ground. Since the grid is at ground potential, it is made negative with respect to the cathode.

Cathode bias is advantageous in that it tends to prevent the r-f amplifier from drawing excessive plate current even with loss of excitation. It affords both operating bias and protective bias. When the plate current rises the bias potential across the cathode resistor also increases so that the rise in plate current is automatically opposed.

A disadvantage of cathode bias is that the resistor is in series with the plate current path through the tube, and the d. c. plate voltage applied to the r-f amplifier tube will be reduced by the amount of the bias voltage. To offset this loss of e. m. f. the total plate supply voltage must equal the desired plate voltage plus the required bias potential.

As mentioned above, when using gridleak bias, some method of protective bias must be used in combination with it to limit plate current flow when excitation fails. A combination of gridleak and cathode bias will serve the purpose, with the cathode resistor providing protective bias and some operating bias, and the grid resistor furnishing the balance of the required operating bias. The circuit is shown in Ⓓ of figure 1. Although protection is afforded, the plate voltage is still reduced by the amount of bias developed across the cathode resistor.

Ⓔ of figure 1 shows a combination of gridleak bias and fixed bias, using either a battery or a bias supply. This arrangement provides both operating and protective bias, with less potential required from the fixed source than in Ⓐ of figure 1, since part of the operating bias is developed across the gridleak resistor. In fact, a combination of all three methods may be used if desired.

Shown in Ⓕ of figure 1 is a self-powered grid bias scheme that has been used successfully for some time. It eliminates the need for an external power supply, yet provides both operating bias and protective bias. It is actually a "self powered" bias supply. It causes no loss of plate voltage as with cathode bias.

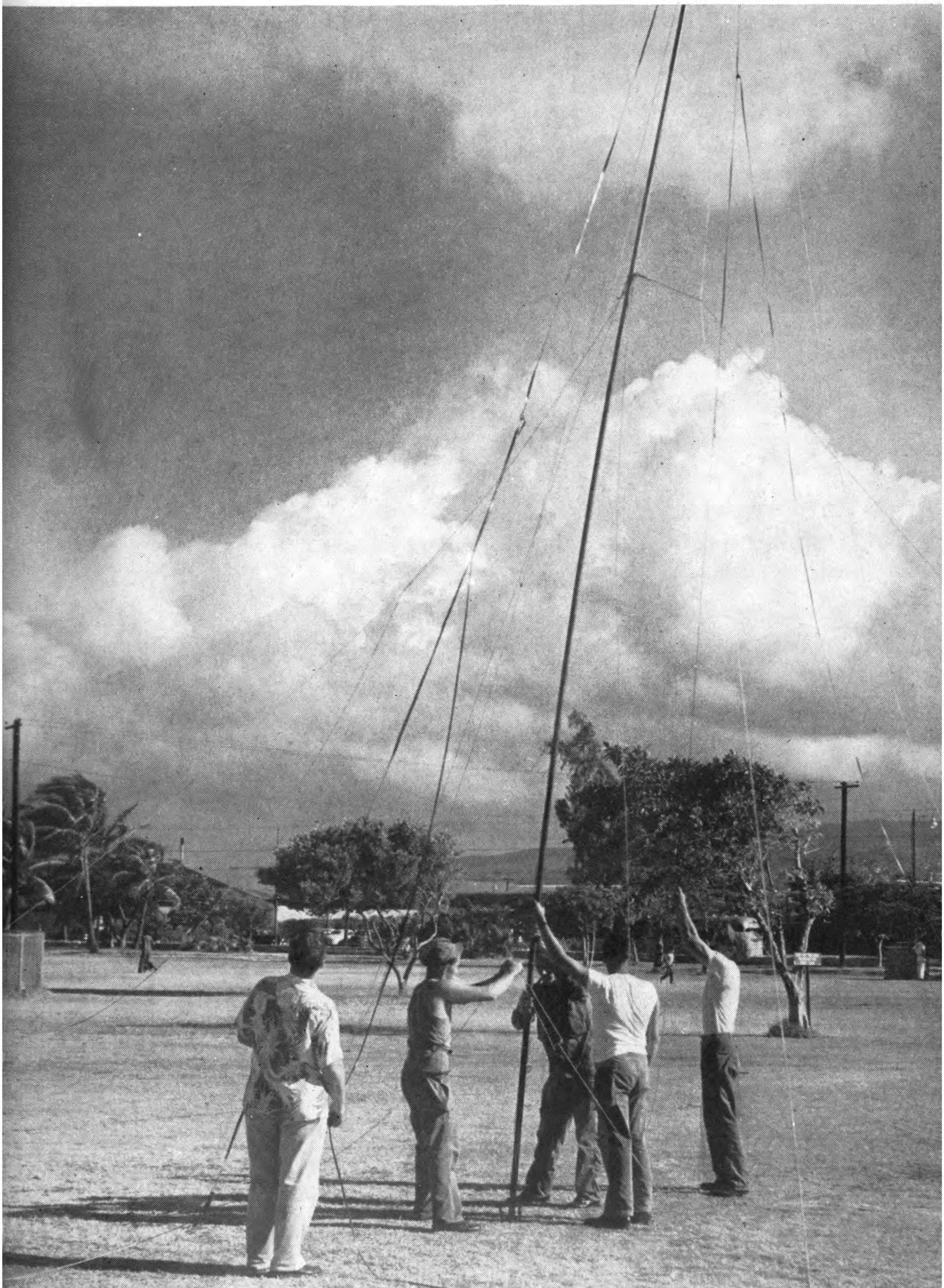
When excitation is applied to the grid of the r-f amplifier, the voltage regulator tube will ignite and the shunt capacitor will become charged. The voltage across this combination will be determined by the rating of the VR tube used. When the excitation is removed, the voltage regulator tube will extinguish and the bias potential will drop to a slightly lower value; however, the charge that remains on

the capacitor is enough to bias the r-f amplifier sufficiently to prevent excessive plate current flow.

If the leakage resistance of the capacitor is high, the capacitor will hold its charge for an appreciable period since grid current does not flow when the grid is negative with respect to the cathode. Therefore, the circuit may be employed with a keyed transmitter as well as with a continuous carrier system. After the transmitter is off the air long enough for the charge to leak completely off, excitation should be applied in order to charge the capacitor before plate power is applied to the r-f amplifier. Since this is the normal way to set up a transmitter, it should cause no inconvenience.

The circuits described here are by no means the only possibilities for grid bias sources. Many other circuits and devices are employed. Nor was the paper written from the standpoint of design considerations. It is hoped, however, that it does present an over-all picture of grid bias supplies for Class "C" amplifiers and some of the problems encountered in this very important section of the modern radio transmitter.

U. S. GOVERNMENT PRINTING OFFICE: 1951



MARS BULLETIN

MARCH 1952
Vol. 3 No. 2

Military Amateur Radio System

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PENTAGON BUILDING, WASHINGTON, D. C.

CROSS INDEX OF VT AND COMMERCIAL TUBE TYPE NUMBERS

Signal Corps VT Tube Type	Commercial Tube Type	Signal Corps VT Tube Type	Commercial Tube Type	Signal Corps VT Tube Type	Commercial Tube Type
VT-25	10	VT-94	6J5	VT-172 Bat.	1S5
VT-25-A	10 Special	VT-94-A	6J5-G	VT-173 Bat.	1T4
VT-27 Bat.	30	VT-94-D	6J5-GT	VT-174 Bat.	3S4
VT-28	24A	VT-95	2A3	VT-175	1613
VT-29	27	VT-96	6N7	VT-176	1853
VT-30	01A	VT-97	5W4	VT-177 Bat.	1LH4
VT-31 Bat.	31	VT-98	6U5 6G5	VT-178 Bat.	1LC6
VT-33 Bat.	33	VT-99	6F8-G	VT-179 Bat.	1LN5
VT-35	35 51	VT-101	837	VT-180 Bat.	3LF4
VT-36	36	VT-103	6SQ7	VT-181	7Z4
VT-37	37	VT-104	12SQ7	VT-182 Bat.	1291
VT-38	38	VT-105	6SC7	VT-183 Di.	1294
VT-44 Bat.	32	VT-107	6V6	VT-185 Bat.	1299
VT-45	45	VT-107-A	6V6-GT	VT-188	7E6
VT-47	47	VT-107-B	6V6-G	VT-189	7F7
VT-48	41	VT-112	6AC7 1852	VT-190	7H7
VT-49	39 44	VT-114	5T4	VT-192	7A4
VT-50	50	VT-115	6L6	VT-193	7C7
VT-51	841	VT-115-A	6L6-G	VT-194	7J7
VT-52	45 Special	VT-116	6SJ7	VT-196	6W5-G
VT-54 Bat.	34	VT-116-B	6SJ7 Special	VT-197-A	5Y3-G
VT-55	865	VT-117	6SK7		5Y3-GT
VT-56	56	VT-120	954	VT-198-A	6G6-G
VT-57	57	VT-121	955	VT-199	6SS7
VT-58	58	VT-124 Bat.	1A5-GT	VT-201	25L6
VT-63	46	VT-125 Bat.	1C5-GT	VT-201-C	25L6-GT
VT-65	6C5	VT-126	6X5	VT-202	9002
VT-66	6F6	VT-126-A	6X5-G	VT-203	9003
VT-67 Bat.	30 Special	VT-126-B	6X5-GT	VT-205	6ST7
VT-68	6B7	VT-131	12SK7	VT-206-A	5V4-G
VT-69	6D6	VT-132	12K8	VT-207	12AH7-GT
VT-70	6F7	VT-133	12SR7	VT-208	7B8-LM
VT-72	842	VT-134	12A6	VT-209	12SG7
VT-73	843	VT-135	12J5-GT	VT-210 Bat.	1S4
VT-74	5Z4	VT-135-A	12J5	VT-211	6SG7
VT-75	75	VT-137	1625	VT-212 Di.	958
VT-76	76	VT-138	1629	VT-213-A	6L5-G
VT-77	77	VT-145	5Z3	VT-214 Di.	12H6
VT-78	78	VT-146 Bat.	1N5-GT	VT-215	6E5
VT-80	80	VT-147 Bat.	1A7-GT	VT-221 Bat.	3Q5-GT
VT-83	83	VT-148 Bat.	1D8-GT	VT-223 Bat.	1H5-GT
VT-84	84	VT-149 Bat.	3A8-GT	VT-224	RK-34
VT-86	6K7	VT-150	6SA7	VT-225	WE307-A
VT-86-A	6K7-G	VT-151	6A8-G	VT-227	KR-7184
VT-86-B	6K7-GT	VT-151-B	6A8-GT	VT-229	6SL7-GT
VT-87	6L7	VT-152	6K6-GT	VT-231	6SN7-GT
VT-87-A	6L7-G	VT-153	12C8 Special	VT-233	6SR7
VT-88	6R7	VT-161	12SA7	VT-234 Bat.	HY-114B
VT-88-A	6R7-G	VT-162	12SJ7	VT-235	HY-615
VT-89	89	VT-163	6C8-G	VT-237 Di.	957
VT-90 Di.	6H6	VT-164	1619	VT-238	956
VT-91	6J7	VT-167	6K8	VT-239 Bat.	1LE3
VT-91-A	6J7-GT	VT-168-A	6Y6-G	VT-243 Di.	1203
VT-92	6Q7	VT-169	12C8	VT-264 Bat.	3Q4
VT-92-A	6Q7-G	VT-170 Bat.	1E5-GP	VT-268	12SC7
VT-93	6B8	VT-171 Bat.	1R5		

MARS BULLETIN

VOLUME III — MARCH 1952 — NUMBER 2

ABOUT THE COVER: *Sergeant First Class William Henry Camp, Mars Headquarters Station operator, examines his Amateur Extra Class Certificate. The over-the-shoulder critic is Corporal Dorothy Kelly, receptionist at the Mars Headquarters Station.*

CONTENTS

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CQ . . . CQ . . . CQ . . .

The Military Amateur Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer. Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control. The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to the appropriate chief; either to Chief, MARS-Army, Room BE 1000, the Pentagon, Washington 25, D. C., or Chief, MARS-Air Force, Room 5B459, the Pentagon, Washington 25, D. C.

EDITORIAL

MARS AND PUBLIC RELATIONS

In this issue of the BULLETIN you will find a reference to a program called "Careers Unlimited," which is the title of a television show emanating from Dumont studios in New York City. The cooperation of MARS Command Directors in First Army and First Air Force areas have made possible the inclusion of MARS as excellent program material.

MARS is not a recruiting program. Nevertheless the radio electronics military occupations provide an excellent showcase and backdrop against which the trained recruiter can tell his story to the public. This is true equally well of the small community as it is of New York City and larger metropolitan centers. A dynamic demonstration of military and amateur coordination is good public relations.

The Public Information Officer at each Army installation is likewise constantly on the alert for news and feature articles dealing with *good* hometown public relations.

Maj. Gen. James M. Gavin, Chief of Staff, Headquarters Allied Forces Southern Europe, recently wrote to the Chief of Information, United States Army, as follows:

"I received a number of copies of my hometown newspaper (Mount Carmel Item, Mount Carmel, Pa.) and while looking over them last evening I noticed a front-page spread on a soldier stationed at Camp Polk, La. I don't know the boy at all, but I was impressed by the front-page-center spread given the story, which I think is the best of grass-roots public relations. I don't know who the PIO of the 198th Field Artillery at Camp Polk is, but obviously his picture and the accompanying description was sufficient to appeal to the editor of the paper, so they gave it prominent display. This sort of thing has always struck me as being the best sort of public relations. Not at all as striking as feature articles in LIFE, but in the long run much more influential on public opinion."

Have you and the other members of yours MARS network been in contact with either an Armed Forces Public Information Officer or with the Recruiting Service nearest you? Get out and get acquainted with them. Tell them what you're doing. Give them demonstrations of how MARS operates. MARS has glamor, eye-appeal and can stage the sort of dignified, technical demonstration which is a perfect tie-in for the Armed Forces public information program.

How about seeing what YOU and YOUR MARS net can do to assist in making the 1952 Armed Forces Day—17 May 1952—a real, local interest livewire demonstration of military-civilian coordination?

A NEW SERVICE FOR MEMBERS

The MARS Headquarters staff has always tried to furnish prompt and reliable information in response to direct query, whether the questions asked were about MARS policy, radio theory, or surplus equipment. It has been suggested that instead of replying to one individual only that the information of general information be disseminated to all MARS members. To do that effectively and cheaply the MARS BULLETIN will, if sufficient queries are received, publish under the heading "SURPLUS DEPARTMENT" diagrams and information about military radio equipment which now is offered for sale on the surplus market. As a matter of economy the MARS staff will not attempt to initiate any study or research but will publish only answers to specific queries. Individual replies will, of course, continue to be sent directly to the person or station initiating the request.

CONDITIONAL CLASS LICENSES

United States military and civilian personnel temporarily overseas may apply for Conditional Class amateur radio operator licenses by mail.

While such license-holding does not authorize amateur operation overseas, it does provide a start on the "experience" required for higher grade licenses when the holder returns to this country. Details, application blanks and examination papers for those in the Atlantic region (Europe, Africa) are obtainable from the Federal Communications Commission, Washington 25, D. C.; persons in the Caribbean should write for information to the FCC's Miami, Fla., office, and those in the Pacific area should write to the Honolulu, T. H., office of the FCC.

A POWER PACK FOR THE SCR-211

Robert H. Decker A9AZJ

Due to supply difficulties in field operation it is sometimes difficult to maintain a supply of dry-cell batteries for operation of battery-powered equipment. Even when batteries are available, their life is relatively short and require frequent replacement. The use of batteries is justified only where complete independence of a-c power lines is mandatory.

The Frequency Meter BC-221 of the SCR-211 set was designed for battery operation, to be completely portable for use in the field. However, many of these fine instruments are to be found in use at installations where they are installed permanently and are not required to be *portable.* For those applications where the BC-221 is "fixed," it seems logical to investigate the possibilities of an a-c power pack.

In order to accomplish this type of operation several important factors must be considered. The BC-221 requires 17 milliamperes at 135 volts and 0.92 ampere at 6 volts for its three tubes. The most important requirement is that the operating voltages remain constant throughout an entire frequency measurement in order to maintain the inherent accuracy of the frequency meter. Physically, the power pack should be small enough to fit into the battery compartment of the BC-221, forming a complete substitute for the six batteries BA-2 and four batteries BA-23 formerly housed there.

With these factors in mind it was decided that a power pack of the electronic voltage-regulated type would prove satisfactory. A regulated unit of this type is able to compensate for changes of line voltage as well as changes in load.

The power pack circuit is of conventional design. Only one operating adjustment is required; the output voltage is adjusted to the desired value of 135 volts by means of the potentiometer $\mathbf{R}_7$. This adjustment should be made with the power pack connected to the frequency meter under normal load conditions, using a sensitive voltmeter.

The rectifier is a regular full-wave arrangement using a type 80 tube (VT-80), followed by a capacitor input filter. The control tube is a 6SJ7 (VT-116) employed as a high gain d-c amplifier, and is so connected that small changes in the power pack output voltage cause corresponding changes in its grid potential. This changing grid potential results in a corresponding change in the current flow through the control tube and the control tube plate load resistor $\mathbf{R}_3$. The voltage drop across R_3 is used to bias the 6F6 (VT-66) regulator tube whose plate-cathode circuit is connected in series with the load. This tube acts as an automatically variable series resistor that maintains a constant output voltage.

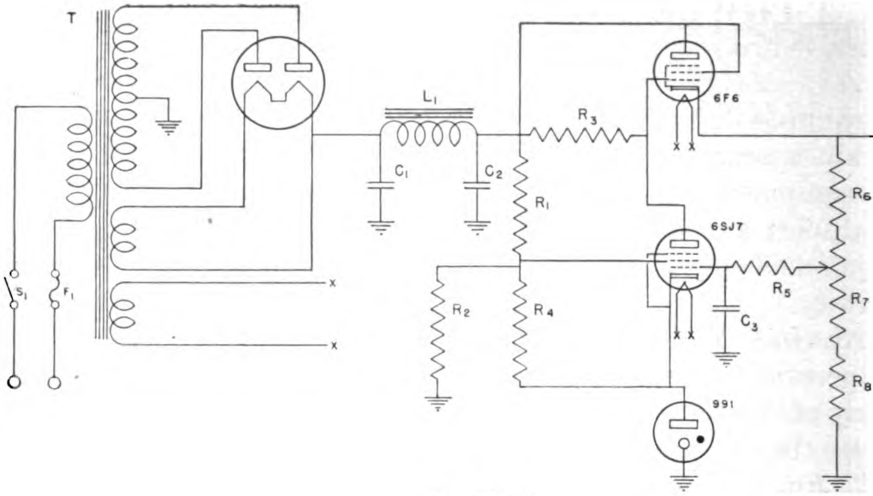


FIGURE 1.

The SCR–211, when equipped with this power pack is practical especially when used in conjunction with a large fixed station where many transmitters are operated on various frequencies. It may be desirable to check each transmitter frequency periodically or, in some cases, it may be necessary to have the frequency meter in operation continuously. Here the power pack would be most advantageous.

In the field where the voltage regulation of the alternating current power source is usually quite poor, the power pack works very well, even where high power CW transmitters cause voltage variations due to keying. In such cases, it operates well enough to supply substantially constant voltage to the frequency meter. With the circuit constants used, the time lag in the action of the system is negligible.

There is one precaution to be observed when employing the power pack with the BC–221. In some models the grid bias for the audio amplifier is obtained by a cathode resistor. In other models the bias is derived from the heater supply voltage. Since this will be alternating current, the cathode resistor bias must be resorted to in order to prevent the introduction of a-c hum into the audio amplifier. Other than this, no change in the frequency meter circuit is necessary.

Parts List

R1—100,000 ohms, ½ watt
R2—100,000 ohms, ½ watt
R3—1 megohm, ½ watt
R4—22,000 ohms, ½ watt
R5—1 megohm, ½ watt
R6—60,000 ohms, ½ watt
R7—15,000 ohms, ½ watt
R8—37,500 ohms, ½ watt
C1—8 mfd, 350 v, electrolytic
C2—8 mfd, 350 v, electrolytic
C3—0.01 mfd, 300 v
L1—30 henrys at 50 m. a.
T1—115 v primary; secondaries 250–0–250 at 60 m. a., 5 v at 2 amp, 6.3 v at 2 amps
S1—SPST toggle
F1—2 amperes, type 3AG
VR—RCA–991
—80, rectifier
—6F6, regulator tube
—6SJ7, control tube

The Japanese Radio Regulatory Commission visits the Military Amateur Radio System Headquarters Station while on a tour of the United States.

ARMED FORCES DAY—1952

MARS and the Navy will again unite to bring United States amateurs and short-wave listeners everywhere an opportunity to participate in the 1952 Armed Forces Day program. Appropriately enough the slogan this year is "UNITY—STRENGTH—FREEDOM." Armed Forces Day falls on the third Saturday in May; this year that will be May 17.

This year's amateur program will follow the same pattern as the successful double-header offered last year. The Army, Navy, and Air Force will co-sponsor a receiving competition and a military-to-amateur test. The receiving competition is open to any short-wave listener who can "read" International Morse Code at 25 wpm. All listeners who submit perfect copies to the Department of Defense will receive certificates of merit attesting their code copying proficiency. Each certificate will bear the signature of the Honorable RobertA. Lovett, Secretary of Defense.

The military-to-amateur test is for licensed amateurs only. Headquarters stations of the Army, Navy, and Air Force (WAR, NSS, AIR) will establish radio contact with amateur operators and will acknowledge these contacts with official "QSL" cards. Each Service station will QSL separately; ambitious amateurs will have an opportunity to earn three different QSL cards.

Receiving Competition

The following times, call letters and frequencies will be employed for the Receiving Competition: (EASTERN STANDARD TIME is used throughout. In converting to local time remember EST is 5 hours earlier than Greenwich time, and is 1 hour later than Central Standard, 2 hours later than Mountain Standard and 3 hours later than Pacific Standard time. Daylight Saving Time will advance Standard Time 1 hour.)

Time	*Call Sign*		*Frequencies*
2000 EST	*AIR*	(Air Force Radio Washington, D. C.)	3497. 5, 6997.5, 27994 kc.
	NSS	(Navy Radio Washington, D. C.)	122, 4390, 9425, 12630, 17000, 21960 kc.
	WAR	(Army Radio Washington, D. C.)	14405, 20994 kc.
2400 EST	*AIR*	(Air Force Radio Washington, D. C.)	3497. 5, 6997. 5, 27994 kc.
	NPG	(Navy Radio San Francisco, Calif.)	115, 9255, 12540, 16265 kc.
	WAR	(Army Radio Washington, D. C.)	14405, 20994 kc.

Each transmission will be preceded by a 5-minute "CQ" call. All transmissions will be at 25 words per minute. If transmission errors

appear on the tape they should be transcribed and submitted as sent. All copies should be submitted to ARMED FORCES DAY CONTEST, Room BE 1000, The Pentagon, Washington 25, D. C.

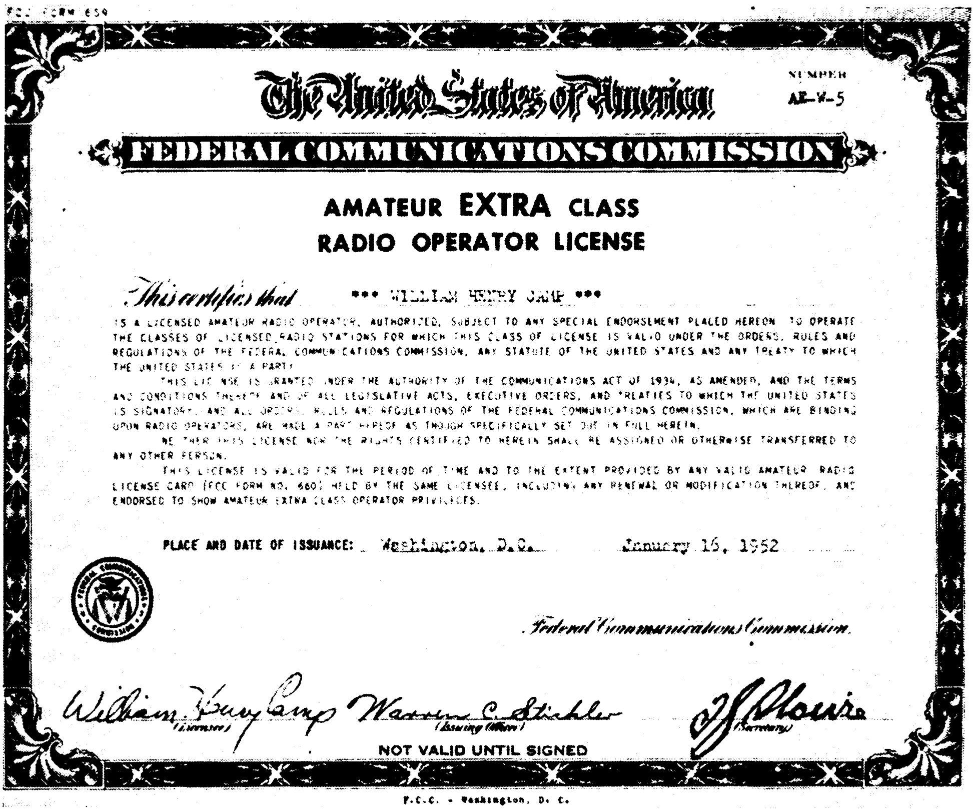
Military-to-Amateur Test

AIR, NSS, and WAR will be on the air between the hours of 1800 and 2400 (Eastern Standard Time) on 17 May 1952, to contact and exchange QTH, signal strength, and readability information with amateur radio stations. The military stations will operate on spot frequencies just outside the amateur portions of the 80-, 40-, and 20-meter bands. No traffic handling or message exchange will be permitted.

A WORD OF CAUTION! MARS members or Naval Reserve members who normally are authorized drill and training privileges on certain military frequencies may not come up on these frequencies being used during the 6-hour military-to-amateur test. In the 1951 exercise a few careless amateurs operated on military frequencies. *THIS IS NOT AUTHORIZED.*

Here's where you'll find the military stations during the test:

AIR—3497.5 (cw), 7635 (cw), 14405 (voice) kc.
NSS—4015 (cw), 7375 (cw) kc.
WAR—4025 (voice), 6997.5 (cw), 13947.5 (cw) kc.



FCC FORM 659

The United States of America

NUMBER AE-V-5

FEDERAL COMMUNICATIONS COMMISSION

AMATEUR EXTRA CLASS
RADIO OPERATOR LICENSE

This certifies that *** WILLIAM HENRY CAMP ***

IS A LICENSED AMATEUR RADIO OPERATOR, AUTHORIZED, SUBJECT TO ANY SPECIAL ENDORSEMENT PLACED HEREON TO OPERATE THE CLASSES OF LICENSED RADIO STATIONS FOR WHICH THIS CLASS OF LICENSE IS VALID UNDER THE ORDERS, RULES AND REGULATIONS OF THE FEDERAL COMMUNICATIONS COMMISSION, ANY STATUTE OF THE UNITED STATES AND ANY TREATY TO WHICH THE UNITED STATES IS A PARTY.

THIS LICENSE IS GRANTED UNDER THE AUTHORITY OF THE COMMUNICATIONS ACT OF 1934, AS AMENDED, AND THE TERMS AND CONDITIONS THEREOF AND OF ALL LEGISLATIVE ACTS, EXECUTIVE ORDERS, AND TREATIES TO WHICH THE UNITED STATES IS SIGNATORY, AND ALL ORDERS, RULES AND REGULATIONS OF THE FEDERAL COMMUNICATIONS COMMISSION, WHICH ARE BINDING UPON RADIO OPERATORS, ARE MADE A PART HEREOF AS THOUGH SPECIFICALLY SET OUT IN FULL HEREIN.

NEITHER THIS LICENSE NOR THE RIGHTS CERTIFIED TO HEREIN SHALL BE ASSIGNED OR OTHERWISE TRANSFERRED TO ANY OTHER PERSON.

THIS LICENSE IS VALID FOR THE PERIOD OF TIME AND TO THE EXTENT PROVIDED BY ANY VALID AMATEUR RADIO LICENSE CARD (FCC FORM NO. 660) HELD BY THE SAME LICENSEE, INCLUDING ANY RENEWAL OR MODIFICATION THEREOF, AND ENDORSED TO SHOW AMATEUR EXTRA CLASS OPERATOR PRIVILEGES.

PLACE AND DATE OF ISSUANCE: Washington, D.C. January 16, 1952

Federal Communications Commission.

William Henry Camp (Licensee) Warren C. Stickler (Issuing Officer) T. J. Slowie (Secretary)

NOT VALID UNTIL SIGNED

F.C.C. - Washington, D. C.

THE AMATEUR EXTRA CLASS CERTIFICATE.

THE AMATEUR EXTRA LICENSE

The MARS BULLETIN will be glad to publish the names of all MARS members who enter the ranks of the elite by sucessfully passing the new and difficult FCC examination for extra class amateur radio operating privileges. In the March 1952 issue of QST you'll find an editorial analysis and discussion of the examination itself. Editors of QST say, in part, ". . . It is fair to say, we believe, that the amateur who has earned his Extra Class license by passing this examination has demonstrated to FCC that he is on a par, at least so far as a broad knowledge of radio technicalities goes, with the best of his commercial brethren. In some phases he has to be better informed. Where, for example, is the commercial ticket holder who has had to show knowledge of single-sideband techniques? . . ."

We'll start off this department with a brief introduction of the first MARS Headquarters Station operator to obtain the new and coveted license.

Sergeant First Class William Henry Camp, Signal Corps, is a "retread." He is one of the Signal Corps reservists who was recalled to active duty because of his radio specialty.

CONVERTING AND READJUSTING FREQUENCY RANGE OF ARC-5 (274N) XMTRS

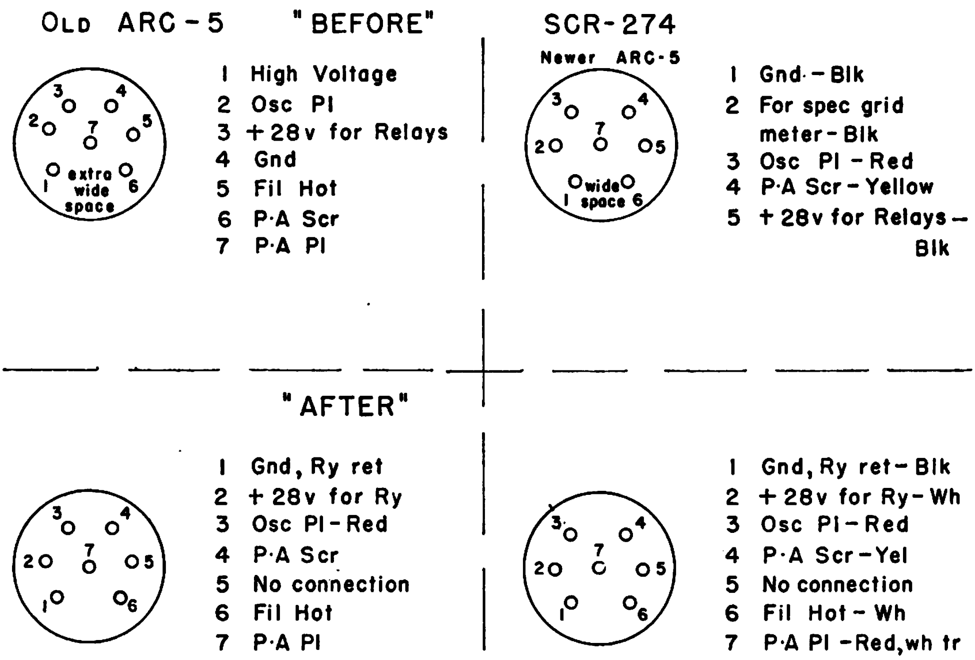
E. M. Link, AØIA

Articles have been published covering conversion of these fine little units to permit their operation with AC on the filaments and with a separate plate supply (converting 274N Transmitter—CQ, May 1946: Conversion of SCR-274N Transmitters for Amateur Band VFO—McCoy, W8CBI).

A subject on which little has been written is the frequency conversion of the BC-457 (4.0 to 5.3 mc) and the BC-458 (5.3 to 7.0 mc) to operate in the amateur bands—*and still give decent tracking of circuits.* It is possible to modify these two transmitters to give comparable performance to the BC-459 and BC-696, and equal or better bandspread coverage of the ham bands.

It was desired, in the conversions made at this station, to retain the original dial calibration values of 10 kc per smallest dial division, so that a circular chart showing revised values at 100-kc intervals could be pasted on the dial, or a fixed value of a few hundred kilocycles could be added to, or subtracted from the dial reading to arrive at the correct frequency.

The first step in any conversion of this type is to remove the aluminum cover from the oscillator coil and condenser assembly. This



Note: ARC-5 color code may differ. Old pin designations may be used, providing proper internal changes are made, reducing work.

FIGURE 1.

assembly is just forward of the 1626 and 1629 tubes and held to the chassis by twelve machine screws.

On a line with the hole at the end opposite the tuning slug, and $11/16$-inch below this hole, drill a $3/8$-inch hole, smoothing off all burrs. This is to give access to the oscillator padding condenser shaft with an insulated screw driver.

Next put plastic solvent on the set screws holding the adjustment arm hub to the shaft and loosen both set screws "B" with a Bristo wrench. Loosen adjusting arm set screw "A"—put arm in center of slot and retighten screw "A."

Remove bottom plate from chassis and repeat the same operation on the PA padding condenser. It may be necessary to dismount this condenser and unsolder the leads, so you can raise it clear of other parts and get enough leverage on your Bristo wrench to loosen the set screws. This step cannot be dispensed with, however. Replace condenser leads and remount, then replace bottom plate, using enough screws (4 or 6) to hold it firmly in place.

BC–457: Add five turns of solid insulated hook-up wire to the oscillator coil at the top, after unsoldering the leads from the top pin. A small "C" clamp is helpful here to avoid letting slack into the oscillator coil while soldering the extra wire on. Close wound, this wire will probably extend a turn above the soldering lug on the coil form. It is well to leave at least the last turn and a half bare, and spaced, so that a portion of the coil may be shorted out to adjust the inductance if necessary.

The figure of "five turns" is not hard-and-fast as from four and a half to five and a half turns may be required. Be sure and use a good piece of spaghetti to carry the end of the winding across the bare turns, for soldering to the lug. Put a drop of plastic cement or two on the spaghetti and wire to keep it in place, being sure that there is no contact between any turn and any other turn.

Now screw the oscillator tuning coil slug to the center of its range of movement, and replace the oscillator assembly shield. The end screws and a center screw on each side are enough. Now add five turns of bare or enamelled No. 18 wire to the P. A. coil. You are now ready for the tedious job of adjusting the tracking. First, the oscillator with the dial, next, the P. A., with the oscillator.

You will need a good stable receiver, and a frequency standard of good quality, which will give you 100-kc check points. Find the one at 4.0 mc, and adjust receiver to zero beat—after both have been turned on for at least a half hour and have "settled down" in frequency.

Turn on the transmitter plate supply (the filaments are assumed to have been on for some time) and tune the transmitter until you pick up its 4.0-mc signal in the receiver. Zero beat it, and note dial reading of transmitter. The P. A. *must* be loaded with a dummy

antenna of some sort and the antenna resonated each time a reading of frequency is made. Loading of the P. A. changes its apparent input capacity and failure to do so may result in errors of calibration of the oscillator up to 50 or 60 kc.

Let us say that you want 3.5 mc at the old 4.0-mc dial setting, and want 4.0 mc to appear on the dial at the old 4.5-mc dial setting. If it falls at a higher value oscillator padding capacity must be reduced. Set dial to 4.5 mc and insert an insulated screw driver into slot in end of oscillator padder shaft, and rotate counterclockwise to get zero beat in receiver. If you are lucky, you will find 3.5 mc close to the old 4.0-mc dial setting. Set receiver to zero beat with standard at 3.5 mc, and then tune transmitter to zero beat with receiver and note dial reading.

If dial reading is now within 50 kc, or five small dial divisions, of the proper reading you *are* lucky.

Adjust the oscillator coil slug to bring the zero beat note to the *other* side of the proper reading an equal amount, go back to 4.0 mc and repeat steps above until 3.5 mc is found within two dial divisions of the old 4.0-mc setting, say at a point one-eighth inch to the left. Put dial on 4.25-mc setting and resonate to zero beat by tuning the slug on the oscillator coil. Then reset dial to 4.0 mc and resonate to zero beat with oscillator padding condenser. Now retune receiver to standard 4.0 mc (actual) and tune transmitter to zero beat. It should now be within one dial division of the proper reading of 4.5 mc and may be adjusted to zero beat with the small single plate trimmer which may be reached through a tube on top of the oscillator shield at the right end, using a small screw driver. This trimmer should be approximately in midposition before starting your adjustment.

If you are unable to resonate both ends of the band in the dial with readings fairly close to their proper readings, either the number of coil turns or their spacing, must be adjusted.

The procedure described should put the oscillator frequency "on the nose" with the dial readings selected. Recheck both ends, then lock set screws and recheck again after replacing all shield screws. Small trimmer should take care of any change required.

Note. The P. A. padder should not be touched during the oscillator calibration unless the plate current is excessive. In this case, insert screw driver through smaller hole on right side of chassis, and adjust P. A. padder for minimum P. A. plate current near midscale.

You are now ready to calibrate the P. A. Remove the load, and adjust to minimum plate current at 4.0 mc (or at a higher dial reading, if desired), tune to 3.5 mc and observe change in P. A. plate current. If more than 6 ma change occurs, adjust at 3.5 mc to minimum using P. A. tuning slug. Retune to 4.0 mc and adjust to minimum plate current with P. A. padding condenser. Repeat these steps until plate

current does not vary more than 3 or 4 ma over useful scale from high to low end.

This procedure may be abridged by using the calibrated crystal of the transmitter, but unless the crystal frequency will fall in the middle third of the revised dial, this method is not advisable.

To use the crystal for calibration, tune to lowest frequency at which "eye" opens wide, note dial reading, and, using both the oscillator padder and the oscillator tuning slug, adjust until resonance occurs at the proper dial setting.

BC-458: The BC-458 may be adjusted to cover the band 5.8 to 7.5 mc using the same calibration procedure. However, changing to a higher frequency coverage, we reduce the coil inductances by shorting out turns, and partial turns.

On the oscillator coil, short the last turn at the top, by soldering a short piece of wire across its beginning and end. Then, counterclockwise a quarter turn, solder another short across the two top turns.

Short the top turn of the P. A. coil at the solder lug. Proceed with calibration as above. This unit will provide all frequencies needed for multiplying into the 11-, 10-, 6-, and 2-meter bands. You will find the effort of conversion will have been well worth while.

NONTACTICAL RADIO EQUIPMENT

The first development model of Radio Set AN/VRC-6 has been received and acceptance tests have been initiated. The AN/VRC-6 is a nontactical receiver and transmitter in the frequency range 25 to 50 megacycles which will be employed as a mobile radio station capable of being installed in all types of motor vehicles for use by the Military Police, Transportation Corps, and Corps of Engineers, according to a report of the Signal Corps Engineering Laboratories.

ZERO BEATING TO NET FREQUENCY

David Talley (A2PF)

The importance of each station of the Military Amateur Radio System being on exact authorized frequencies—or, at least being safely within tolerance limits—can not be overstressed. An increasing number of MARS members are using crystal controlled oscillators to insure frequency compliance. Crystal control is probably the safest method if the crystal unit will operate within the required frequency tolerance. The tolerance authorized by the Office of the Chief Signal Officer for the MARS 4-megacycle frequencies is 0.01 percent. This figure means that a signal frequency may vary above or below the authorized frequency *by not more* than 0.01 percent of the authorized frequency. When using a MARS 4-megacycle frequency, the maximum allowable deviations are as follows: 4085 kcs, plus or minus 409 cycles; 4080 kcs, plus or minus 408 cycles; 4025 kcs, plus or minus 403 cycles; and 4020 kcs, plus or minus 402 cycles. These tolerance limits are not to be construed as permission to "wander around" between them. You are expected to attempt as accurately as you are able, to adjust to the *exact* authorized frequency—and if your equipment fails to meet this requirement, you will be forgiven a deviation that does not exceed the required tolerance.

Many stations in the MARS employ variable-frequency control (VFO) and it is the particular purpose of this article to show such members the best means of insuring on-frequency compliance by "netting" their transmitters, by zero beating their oscillators to the net frequency. A2USA, A1USA and other Net Control Stations are crystal controlled or have other accurate means of assuring operation within the specified 0.01 percent frequency tolerance. Such key stations should be used for the zero beat process to be described below.

Your transmitter oscillator and receiver should first be allowed to warm up to stable operating temperature (15 to 30 minutes, depending upon the individual equipments). Then, proceed as follows:

1. Turn on the beat-frequency oscillator of the receiver and carefully adjust it to zero beat with the Net Control Station carrier. Be sure to tune to zero beat with the *carrier* and not the sidebands. This adjusment should be performed when the NCS is not modulating his carrier.
2. Carefully adjust the variable-frequency oscillator of the transmitter to exact zero beat with the NCS carrier. Do not touch the receiver tuning dial or other receiver control during this zero beat procedure.
3. Using the lowest possible power input to the final stage, turn on the transmitter and verify that the transmitter's frequency does

not change in any way. This can be verified by the fact that there is no change in the zero beat heard in the receiver. If the transmitter has no provision for low power (10 watts or less) input, it is suggested that this facility be provided.

4. If an audio tone is heard in the receiver at any time during the above adjustments, it indicates that something is not in zero beat. It may be the receiver beat frequency oscillator, or it may be the transmitter variable-frequency oscillator. In either case, the frequency of the audio tone will indicate how far off zero beat the adjustment is at the time.

It is important that the desired carrier be identified before proceeding with the aforementioned adjustments.

Net Control Stations and MARS monitoring stations will advise off-frequency MARS stations to the effect that "You are off frequency" (ZRA2 or ZRA3) "You will cease transmitting immediately (QRT) until you have adjusted your transmitter for proper operation on the authorized frequency."

FREQUENCY EMISSION TERMS DEFINED

To help those who may not remember or who are not familiar with the definitions of emission terms as used by the Armed Forces the following emissions are explained.

0.1A1—Manual telegraphy (Morse Code) at a speed of approximately 25 words per minute. Bandwith 100 cycles per second.

2A2 —Manual telegraphy (Morse Code) by the keying of a modulating audio frequency or by keying the modulated emission at approximately 25 words per minute with 1000-cycle tone. Bandwidth 2000 cycles per second.

6A3 —Amplitude modulated telephony, 3000-cycle modulation frequency using double sideband full carrier. Bandwidth 6000 cycles per second.

8A4 —Facsimile transmission, carrier modulated by tone and by keying (high definition). Maximum bandwith 800 cycles per second.

1.1F1 —Radio teletypewriter transmission at approximately 60 words per minute using 850-cycle frequency shift. Bandwidth 1100 cycles per second.

3A3a —Single sideband modulation with reduced carrier and with the highest modulation frequency no more than 3000 cycles.

MARS STEPS AHEAD—RADIOTELETYPEWRITER

Sergeant Norman K. Hester (AF9SCK)

Radio frequency shift teletypewriter (RATT) has been a part of the MARS program since late summer 1951. Participation by MARS stations has been limited. Expansion is expected as equipment becomes available and as the principles of radioteletypewriter operation become better known.

Schedules are maintained twice daily on 7635 kc (1000–1100 and 1600–1700 EST) between AF2AIR (Mitchell Air Force Base, New York), AF2EMS (Fort Monmouth, New Jersey), AF2FAL (Stewart Air Force Base, Georgia), AF8AIR (Wright Patterson Air Force Base, Ohio), and AIR (net control station in the Pentagon Building, Washington, D. C.).

A large volume of traffic and training is possible through RATT. However, it is possible only as frequencies are available. At the present time MARS shared frequencies (3497.5, 6997.5, 14405, 20994 and 27994) have been approved for frequency shift keying. Only limited operation is authorized on these frequencies, however, pending study and designation of operational areas and schedules by the Chiefs, MARS.

The transmitter in use at AIR on 7635 kc is a Collins Model 30K with modified exciter. It is located across the Potomac river from Department of Air Force Headquarters, at Bolling Air Force Base, and is remotely operated from the Pentagon.

This transmitter serves a dual purpose; it is used for both phone and frequency shift. D-c neutral keying impulses (used for shifting exciter frequency), audio information, and transmitter control voltage are sent over two leased-telephone cable pairs. The transmitter power input is 325 watts.

AIR also has transmitters for 3497.5 and 6997.5 kc. These are located approximately 12 miles away at Andrews Air Force Base, Md., and are operated at a power rating of 1 kilowatt. Remote keying for both CW and radioteletypewriter is possible and is accomplished by use of tone keyers, with the output of a 1000-cycle tone sent over a single cable pair for each transmitter. At the transmitter tones are demodulated and converted into d-c pulses for keying the transmitters.

MARS members with equipment to receive teletypewriter signals are invited to "listen in" during the above schedules. The stations are keying mark high using standard frequency shift of 425 CPS either side of center frequency of 7635 kc.

SERGEANT OPERATING SIGNAL CORPS EQUIPMENT SOMEWHERE IN KOREA.

MESSAGES UNLIMITED

Lee lost the battle of Gettysburg, some historians say, because of poor communications. He badly needed his cavalry, which was making a reconnaissance behind the Union lines, but there was no way to contact them. Had he gotten their support and the information they had gathered, he might have won.

Today the Signal Corps' biggest job is to see that no American general loses a battle because of poor communications. Recently it has developed and battle-tested one of the finest pieces of communication equipment in 20 years—a mobile radioteletypewriter station.

This set, known as the AN/GRC–26, has been successfully operating in Korea for the past 5 months. It is compact, easy to set up, easy to operate, and as trouble-free as any equipment of its type. The entire set is mounted on an ordinary 2½-ton Army truck with a 2-wheel trailer carrying a gasoline-driven generator. Inside the van two or three operators can work in comfort with forced draft ventilation in summer and an electric heater in winter. Two teletypewriters send and receive messages simultaneously at the rate of 100,000 words a day, and a radio telephone permits conversation between sets at any time. The entire unit can be quickly detached from the truck bed

Antenna Farm for AN/GRC 26.

and placed on the ground, aboard ship, or inside the C–119 cargo plane.

The AN/GRC–26 is a rugged piece of equipment. It will go anywhere the truck can take it and stay in operation. Four sets went ashore at Inchon on D-plus-6-days, and had they been combat-loaded they could have just as easily rolled ashore on D-day. One unit went with the 7th Division in its attack south from Inchon to Suwon and back toward Seoul. Another unit was flown to Wonsan to provide communication for X Corps Advance. Still another unit was sent to I ROK Corps.

One experienced communications officer found its toughness amazing. He had thought the set wouldn't last very long over the dusty, rough Korean roads.

"I've never seen anything like the AN/GRC–26," he said. "We drove it around for as much as 45 miles at a stretch. We gave it the worst beating I've ever seen given to a piece of equipment in its class. But when it came up for test, it worked. I don't know how, but it did."

It is one of the "surprise" technical weapons to come out of the Korean war. Mobile radioteletypewriter stations had never been successfully tried in World War II. The equipment used for radioteletypewriter operation then was too bulky and too heavy. Before the AN/GRC–26 was tried out some people doubted it could do the job called for in Korea, which is one of the worst countries in the world for radio transmission. It is mountainous and minerals in the soil absorb most of the radio ground waves. Before the war amateur radio operators in Seoul and Pusan found it difficult to contact each

other and they often relayed messages through other amateur stations in Tokyo.

But the AN/GRC–26 did the job. At Wonsan, the X Corps had 3 channels to GHQ in Tokyo, 1 channel to 8th Army, 1 channel to the 7th Division and 1 channel to I ROK Corps—all of them mobile radioteletypewriter circuits.

It has solved the problem of handling volumes of messages at high speed. For the days when a general and his staff could utter a single word "Attack!" disappeared with the horse cavalry and the campaign hat. Today the length of the average military message sent or received in a large headquarters is close to 200 words. Comprehensive staff reports and long supply requisitions often run this figure into the thousands. The manual CW operator with his key can't handle this volume. His 20 or 30 words a minute is too slow. But now mobile radioteletypewriter communication is a proven fact, easy to set up, easy to operate, and as trouble-free as any equipment a unit in the field can hope to obtain.

MICROWAVE WAVE SITING

The Signal Corps labs are preparing a step-by-step guide for military field use in establishing a microwave relay system. There is no available consolidation at this time of data for field use in selecting sites for the individual stations in a microwave radio relay system. Investigation also is being made of the feasibility of using an airborne altimeter in obtaining ground elevation information for radio relay siting. Data obtained from Aero Service Corp., Philadelphia, Pa., and from the Photographic Reconnaissance Laboratory indicate that airborne profile recordings utilizing their equipment may be made with an accuracy of ±20 feet.

ENGINE SUPPRESSION SPECIFICATION

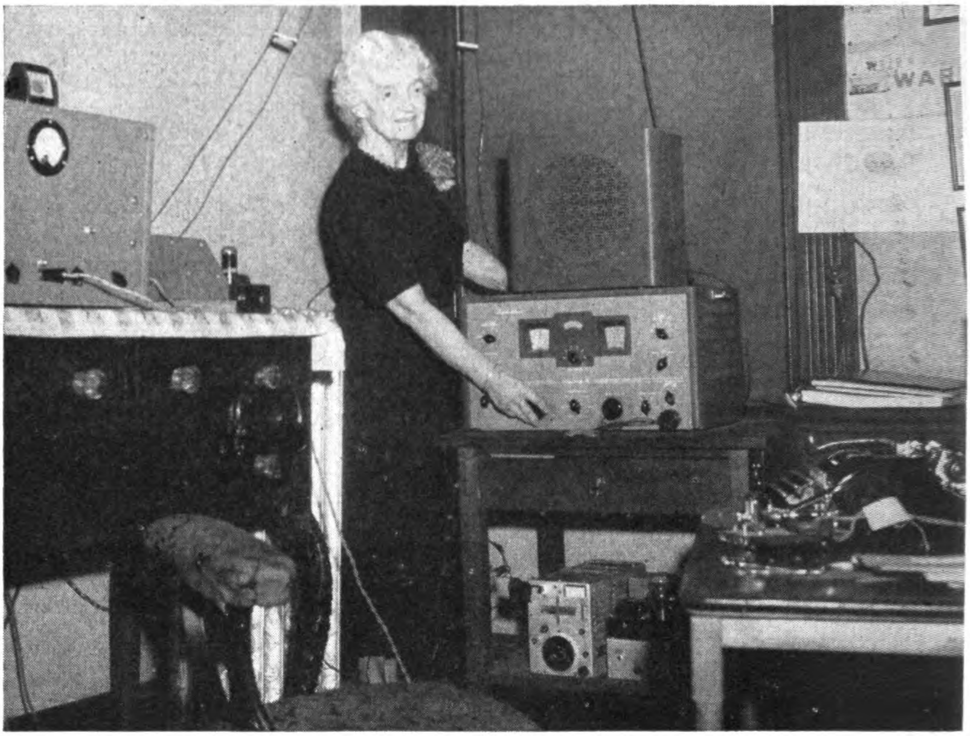
The Munitions Board has announced establishment of a project for preparation and coordination of a joint specification for radio interference suppression requirements of industrial internal combustion engines. The Signal Corps is designated as custodian.

SURFACE WAVE TRANSMISSION LINES; BAND SEPARATION FILTERS

Investigations are being conducted at the Signal Corp Engineering Laboratories on a 2-mile experimental surface wave line for the 100- to 300-megacycle range. Losses measured over sections of the line have been compared to theoretical attenuation values. Results of attenuation measurements made so far, during rain, have shown no measurable increase in line loss, but the effect of ice coating on the line is expected to cause a large increase in attenuation. However, since ice will not form if the temperature of the line is a few degrees above that of the surrounding air, the line could be electrically heated when ice conditions are likely. Instruments are now being installed for continuous recording of line attenuation for 3 months.

Under contracts with Sperry Gyroscope Corp. work is underway on development of practical designs of surface-wave transmission lines for antenna systems, and development of band separation filters (branching filters) which will permit efficient use of a single antenna and transmission line in radio relay systems. Design and construction of surface-wave line units having design center frequencies of 600, 2,000, and 6,000 megacycles to provide complete coverage of the frequency range 300 to 9,000 megacycles have been completed for final testing.

Band separation filters are to be developed and constructed for operation on specified bands within the frequency range, 50 to 8,500 megacycles. Each band separation filter will consist of a combination of a low pass and a high pass branch, resulting in a composite network having three terminals for connection to the receiver, transmitter, and antenna. Each frequency band is divided into two usable parts, separated by a narrow cross-over region. Through the use of two band separation filters having narrow cross-over bands on opposite sides of the center frequency all the frequencies in the total band are made available. The 14 filters (7 bands) to be developed have lumped, coaxial, or waveguide filter elements as the frequency bands increase in the range from 50 to 8,500 megacycles. Models of the low frequency band units employing lumped elements have been designed and constructed. Final tests of these units are in progress. Some design work has been accomplished on the coaxial type in the 2,000-megacycle frequency range.



A1ZR/W1ZR

MARS YL—A1ZR

At an age when most women are ready to retire, to sit back in their rocking chairs and knit, MARS YL Edith E. Rotch (A1ZR/W1ZR) is still an active leader in her own community and an active radio amateur.

Edith won Phi Beta Kappa honors and was graduated Magna Cum Laude from Radcliffe Women's College, Cambridge, Mass., in 1900. It was 1917, and the World War I period, when she first became interested in radio. Since that time radio has been an important part of her life.

When World War I broke out Edith studied shorthand and typing at Byrant and Stratton school in Boston in order to obtain a war job. She followed the secretarial training with a course in radio at the Eastern Radio Institute, receiving her Commercial First Grade Radio Operator License in August 1917. She was assigned at once to duty with the Amrad Company of West Medford, Mass., as a "Junior Inspector-at-large" under the Signal Corps, Northeastern Department.

Edith had too much energy to be satisfied with only one job. She became a code instructor and served as an examining officer in the U. S. Radio School at Boston. She did this work at night in addition to her daytime Signal Corps duties at Amrad.

When the war ended Edith was licensed as W1RO and went on the air operating a spark transmitter. In 1923 she was issued a Commercial Experimental and Instructor Grade license with experimental station call letters W1ZR.

She was employed with the Boston office of Postal Telegraph Co. 15 years. Then came World War II. Edith served as an observer with the First Fighter Command Aircraft Warning Service, participated in a propagation research project jointly sponsored by the National Bureau of Standards and the American Radio Relay League, and served as a worker in Red Cross Canteens at New Bedford and Boston.

After World War II, when the freeze on amateur communications was lifted, W1ZR was among the first to resume amateur activity. Equipment by this time included a HQ–129–X receiver, a Meissner 150–B transmitter and two smaller transmitters. Edith became an active member of the Swing Shift, Eastern Shuttle, Eastern Massachusetts, Petticoat and Fish nets. She also became a member of the Rag Chewers Club.

Lest by this time you may think Edith has allowed radio to dominate her life, here are a few of her other accomplishments: She has appeared as a Fancy Dancer in Vincent Club performances and charity shows at Boston theaters; she, with her brother and sister, was a member of a four-man skating team which competed against the Canadian Four in an International Skating Competition at Ottawa, Canada; she has twice won (with Hazel Wightman for partner) the National Women's Doubles Tennis Championship; once (with N. W. Niles for partner) she won the National Mixed Doubles. Edith is rated excellent in bowling, fencing, and sailing. A more recent hobby is Duplicate-Bridge matches. Edith holds a "masters degree" certificate in this hobby signed by Ely Culbertson.

. . . and if you tune across the band without hearing A1ZR/W1ZR it may be that an early spring in Boston has Edith setting out her garden and readying herself for the annual battle with the weeds. You see, she's also a gardener.

A4KJ—FLORIDA NET CONTROL

The MARS (Army) net control station for Florida is located at New Port Richey, about 40 miles north of St. Petersburg on Highway 19. Lt. Comdr. Harold B. Doten, USCG, retired, is the operator. Call letters are A4KJ.

Commander Doten's grandmother was the first Western Union operator in Plymouth, Massachusetts, the commander relates. To this early communication background in the family history he attributes his interest in the field.

His Coast Guard service, also, centered around communications. For several years he served directly under the Chief of Communication, USCG, Capt. E. M. Webster (now a member of the Federal Communications Commission).

At the age of 14 young Harold started his wireless career at Plymouth, Massachusetts. He describes his station equipment of that time as follows: "crude but 'modern' tuning coils, carbon and needle detectors, plus the telephone receiver, and the old coherer and decoherer."

The former detectors soon were replaced by the electrolytic detector. This consisted of two electrodes in a weak sulphuric acid solution, one of which consisted of a 0.001-inch platinum wire sealed in a tube. The tip of the wire was ground down and submerged in the acid solution. Contact with the wire was made by means of mercury placed in the tube with its potentiometer to control the flow of battery current and increase its sensitivity. Inductive tuners with fixed primaries and variable secondaries and variable condensers rounded out the receivers. Spark coils with spark gaps (connected direct to antenna and ground) constituted the transmitter; primary keying was utilized. Later a tuning helix with condensers was added which, the Commander states, was always over 200 meters. There was no FCC in those days.

The Department of Commerce and Labor issued his first grade commercial operator license in 1911. Code speed requirements then were 15 words per minute American Morse and 12 words per minute Continental code. In 1912 when the United States amateur station licenses became available Harold Doten received one of the first calls—1 KH.

The present 4KJ shack measures 10 feet by 18 feet and is attached to the rear of Commander Doten's garage. The main transmitter is capable of being operated on bands from 80 to 10; it consists of a pair of 810s push-pull in the final stage and has a selenium bias supply. The rig is capable of maximum output on CW and about 600 watts on phone. The 810's are excited by either a 5514 or 807, as may be required to obtain sufficient drive for the operating frequency.

Latest information from Third Army Headquarters indicates that 4KJ's CW rig is a 5514 running about 250 watts, normally excited on 80 meters by a single 6L6 with a 6AG7 crystal oscillator or VFO. It can be operated on all bands by doubling and operating a pair of 6L6's in push-pull for additional excitation. This rig is a complete transmitter with its own separate power and bias supplies.

The transmitting antenna is an 80-meter doublet unit, 6-inch spaced open wire leads, and is used on 40 and 20. A four element folded dipole beam is used for 10 and a similar type for 2 meters.

The receiving antenna is a small doublet on top of the garage and has 2-inch spaced open wire lead in. This antenna is at right angles to the main transmitting antenna; it is planned to install "break-in" equipment.

Three recivers in use include a Hammarlund HQ–129–X, a National 1–10 and a 1068A converted to two meters. There is also a home constructed preamplifier and audiofilter; either or both may be used as required. Commander Doten reports that the filter is used to advantage on WAR Broadcasts but can't be used on net operations, because of necessity for adjustment changes which require too much time.

A4KJ/W4KJ

BEAMED OUR WAY

Brooklyn, New York

. . . I was pleased to have the opportunity to attend the MARS Advisory Committee meeting in Washington. I hope to do so again if possible. As you know, I am Chairman of First Army MARS Advisory Committee. May I suggest again that other Army Areas be encouraged to form MARS Advisory Committees to assist the MARS Director and to handle the increasing administrative work of the MARS program. Since most of the MARS members will soon be civilians without military affiliation, it would seem desirable to decentralize the MARS administrative work within Army Areas similar to the Section Communication Managers of the A. R. R. L.

David Talley, A2PF

THE IDEA SEEMS A GOOD ONE, DAVE, BUT I'M AFRAID WE NEED A LITTLE OF YOUR ENTHUSIASM TO SPREAD AROUND THE COUNTRY TO GET IT ADOPTED. ANYBODY ELSE HAVE ANY SUGGESTIONS ON HOW TO DECENTRALIZE MARS?

Albany, New York

. . . I have no fault to find with the SIG Manual 439–1, but after awhile I decided I would like to have the essence of the message form all on one sheet (instead of scattered through the manual). The attached sheet is the result of my effort . . . . .

Charles R. Wagner, A2FEN

COLONEL WAGNER SENT US AN EXCELLENT BREAKDOWN OF THE SALIENT INFORMATION NEEDED FOR THE MESSAGE FORM. DON'T KNOW IF WE'LL BE ABLE TO REVAMP THE FORMAT OF THE MANUAL TO INCLUDE IT JUST THE WAY YOU HAVE IT, COLONEL, BUT AS A SEPARATE SHEET IT WOULD CERTAINLY BE HELPFUL AS A READY REFERENCE IN EVERY SHACK.

Portland, Maine

. . . Manual SIG 439–1 very clear and concise. Would suggest that the typewriter format responsible for some information not being presented in forcible manner.

John R. Middlebrook, A1GVS

. . . How about all operating signals appearing in the rear of SIG 439–1, preferably as a supplement. An operator properly indoctrinated in JANAP should rarely have to refer to the manual for other than general information. . . . All headings and subheadings should be in bolder type.

Willard J. Zahalka, A9CFP

YOU'RE RIGHT ON ALL COUNTS, AND YOUR SUGGESTION IS BEING INCLUDED IN THE REVISION DISCUSSIONS NOW UNDERWAY.

San Pablo, California

. . . My suggestions for revision of Manual SIG 439–1 follow. A comprehensive index should be provided. Eliminate superfluous examples. The manual should be as brief as MARS operating procedure.

Manley W. Cole, A6FAO

Ardmore, Oklahoma

. . . Thought you might like to have the reaction of an ordinary garden variety of Ham who has had no previous military experience. I have a better picture now, but when I first saw Manual SIG 439–1 my big question was: "What does a complete message look like?" Amateur procedure tells us a message is composed of address, text, and signature. MARS says a message has heading, text, and ending. In conversion from Amateur to MARS, how was the signature handled?

R. G. Patterson, A5PNG

HOPE YOU'RE STRAIGHTENED OUT ON THIS NOW. THE CHIEF, MARS (ARMY) HAS PUT OUT EXAMPLES OF THIS TO BE DISSEMINATED TO ALL MARS MEMBERS, AND IT WILL BE INCLUDED IN THE REVISED SIG 439–1.

Chevy Chase, Maryland

. . . Reference Manual Sig 439–1, it appears to me the Manual is confusing, has too many examples and is unnecessarily extensive for the average amateur operator. It is doubtful if any large percentage of amateurs ever master its contents. Whether or not they do so depends largely on—

a. Their technical proficiency and time devoted to study.

b. Time devoted, or allotted, to net drill.

c. The initiative and resourcefulness of the NCS.

I would recommend the Manual be simplified and possibly divided into two parts, Part I containing what every military operator should be familiar with; Part II containing the unusual, available for study or reference.

Guy V. Henry, A3JCA

Mt. Vernon, New Hampshire

It was nice to receive with the BULLETIN a sheet giving method of conversion from Amateur to MARS and vice versa. . . . In the last bulletin the circuits for grid bias were interesting; figure 1–F on page 43 has been used for a long time on my final amplifier. A few things have been discovered in regard to operation of this type of bias supply. First of all, only a carefully neutralized triode amplifier should be trusted if keying of the buffer stage is to take place. There should be no trouble from "taking off" of the final, as it will choke itself and, being in a state which prevents the tube from furnishing its own losses, no plate current will be drawn during key-up if the VR tube is large enough to furnish sufficient bias. Originally the only bypass condenser was a mica 0.006, but a 1.0 mfd condenser was added some time later. It is presumed that damage would result if the VR tube were to be used where more than rated maximum current flowed; that has not been tried here.

On one occasion a VR tube was tried in the grid of an 807 and failed to produce the desired result. This may have been due to a minimum starting current, but probably is inherent in any triode or pentode tube where screen current would continue to flow and plate current would not be held back by a negative space charge. No trouble will be experienced when using phone only; as some amateurs discovered that grid-leak bias injected a hum in the receiver unless the grid circuit was opened up while listening, this is the answer to that problem, too. As further tests and experiments are made worthwhile results will be forwarded to MARS headquarters. . . . In regard to 2 meters and AF4HBD. I agree that 132 mc with a receiver tuning range of 12 to 16 mc sounds very good; I have that in mind also. In my case I have a 5.5-mc crystal which will add up

to 132 mc when multiplied 24 times. Anyone else with one of these surplus (or otherwise) crystals may wish to use it in this manner.

Robert P. Thayer, A1PBE

Dallas, Texas

. . . Your last BULLETIN was very good. I am now able to participate in MARS with my Collins equipment. Let's make MARS and the BULLETIN even better yet.

Carlos L. Dodd, A5NUX

Sioux Falls, South Dakota

On behalf of the few MARS members in South Dakota our thanks for publishing the MARS BULLETIN . . . keep up the conversion articles . . . included in antenna articles should be a graph of maximum pattern results . . .

J. W. Sikorski, AØRRN

ALL RIGHT FELLOWS, SEND IN YOUR ARTICLES: WE'LL GLADLY PUBLISH THEM FOR THE BENEFIT OF ØRRN AND ALL MARS MEMBERS.

Port Angeles, Washington

I like the MARS BULLETIN, and hope that you can continue publication. Here are four suggestions—Publish a list of military tube types and their commercial equivalent numbers; give us some propagation information for circuits within the United States; publish unclassified information of new equipment; publish photographs, circuit diagrams and general information for military radio equipment which now is being offered for sale on the surplus market.

George L. Buck, Jr., A7BSD

WHEW, THAT'S QUITE AN ORDER, GEORGE. WE'LL DO OUR BEST. A LIST OF TUBE TYPES AND COMMERCIAL EQUIVALENTS WILL BE FOUND IN THIS ISSUE; A PROPAGATION PREDICTION INFORMATION PROJECT HAS BEEN UNDER CONSIDERATION HERE FOR SOME TIME AND WE HOPE TO OFFER THIS SERVICE SOON; NEW EQUIPMENT INFORMATION WE SHALL TRY TO OFFER YOU; FOR SURPLUS EQUIPMENT INFORMATION LOOK FOR THE ANNOUNCEMENT IN THIS BULLETIN OF A "SURPLUS DEPARTMENT" WHERE MEMBERS ARE INVITED TO ASK ABOUT SPECIFIC EQUIPMENTS. INFORMATION WILL BE PUBLISHED IN REPLY TO SPECIFIC QUERIES.

Buffalo 8, New York

. . . Every night that I pick up the paper I find that blood and blood plasma is vitally needed. I want to do something about it. But what? . . . Amateurs are always ready in time of disaster . . . why wouldn't they be ready for such a disaster as this? . . . I don't want any credit . . . all I want is blood donors by the hundreds . . . I have mailed letters to QST, CQ, and YLRL.

Clara C. Reger, A2RUF

HOW ABOUT IT, MARS MEMBERS? THE BOYS OVERSEAS AND IN THE SERVICE HOSPITALS NEED BLOOD. CALL THE RED CROSS FOR AN APPOINTMENT TO DONATE A PINT OF BLOOD. JUST TELL 'EM A2RUF SENT YOU.

PROPER SENDING TECHNIQUES

Most MARS members are, or should be, familiar with the technique of proper sending. Amateur newcomers and MARS novices, in particular, should learn the correct methods of sending code. Many of the more experienced "hands" also will want to review.

In learning to transmit code, it is important that the sending speed not lag appreciably behind the receiving speed.

Of course the best way to learn to send well is to imitate a good signal. The beginner should listen carefully to properly formed characters, either from a tape or from an instructor's hand key, and then model his sending after that pattern.

The hand key must be properly adjusted and the contacts properly spaced before you will be able to send correctly. Figure 1 is a detailed drawing of a hand key indicating the parts referred to in the following adjustment instructions:

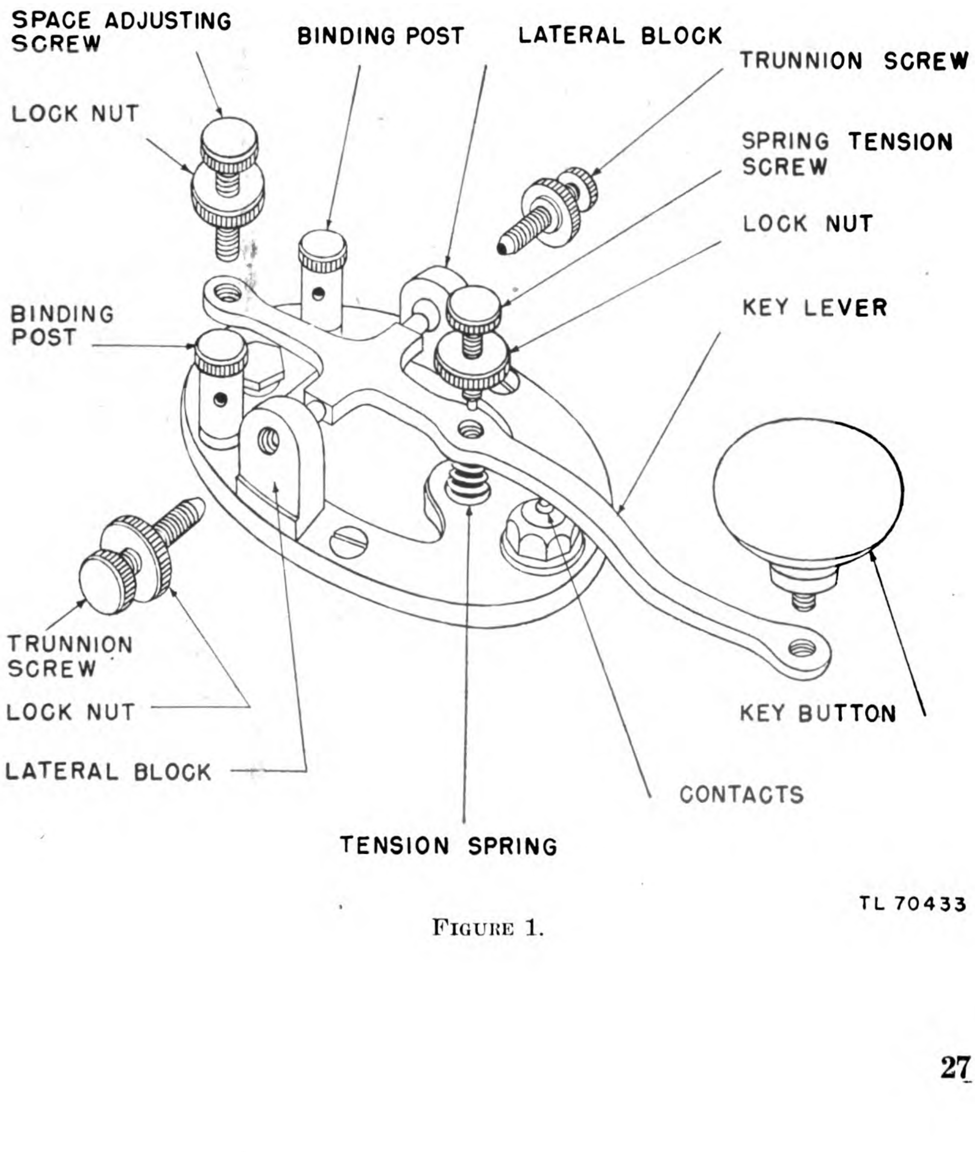


FIGURE 1.

The Spring Tension Screw—just behind the key button, controls the amount of tension exerted upward on the key; the tension allowed will usually vary with individual operators. Too much tension will force the key button up before the dahs are completely formed and they will be too short, spacing will be irregular, and you will skip dits. If the spring tension is too weak, the characters will run together and the space between characters will be too short.

The Space Adjusting Screw—regulates the gap between the contacts. This gap should be about the thickness of a penny postcard. This measurement applies to every key, and is not a matter of personal preference. Contacts that are too close together have an effect similar to weak spring tension, and contacts that are spaced too far apart have the same effect on sending as too much spring tension.

The Trunnion Screws—at either side of the key control the alinement of the contact points. This is the sidewise alinement of the contact points; contacts should be kept free from dirt to prevent a scratchy signal. If the trunnion screws are too tight the key lever will bind; if they are too loose the contacts will have a sidewise play.

Position of Hand at Key

The correct position at the key is the position that is natural and comfortable for you. See figure 2. Some pointers which have helped other good radio operators include the following:

(1) Lay your arm along the table in a natural position so that fingers reach the key button without straining.

(2) The tip of the index finger or the tips of the first two fingers should touch the top of the key button at the far edge or just overlapping the far edge. Keep fingers away from the metallic parts of the key to avoid possible shock.

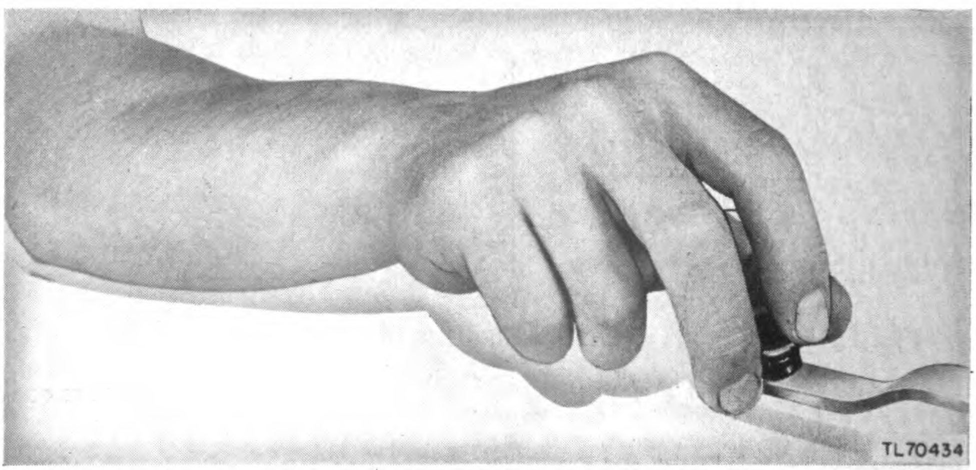


FIGURE 2.

(3) The thumb and third or fourth fingers should touch the right and left sides of the knob lightly to guide and prevent slapping the key.

(4) Allow the forearm muscles to do most of the work when sending. Too much strain on smaller muscles of the wrist or hand will result in a "glass arm" (temporary paralysis caused by over-fatigue).

Figure 3 presents some common INCORRECT positions of the hand on the sending key.

The Nibbler—pinches the edge of the key button, curling his fingers unnaturally, and using the small wrist muscles to operate the key.

The Tea Drinker—sends with fingers strained and uncomfortable; he will tire quickly.

The Slapper—has no control over the key; his sending will be rough and inaccurate.

The Hitch Hiker—is identified by his thumb. His thumb does not aid in guiding the key. His hand will slip off the button and spoil the rhythm of his sending.

The Tapper—makes no attempt to control the key; his sending will be halting and erratic.

The Jitter—sends too many dits and tends to cut his dahs too short. His hand trembles constantly.

The Clutcher—is tightened up. His sending will be slow and clumsy, and his hand will cramp after a short time in this position.

The Pounder—will tire quickly since the muscles of the hand instead of the forearm are employed in this position. His sending is stiff and uncontrolled.

Look again at figure 2. Note that the operator prefers the index finger on top of the button, using the thumb and third finger as guides at the side. Compare this position with the hand illustrated in figure 4 which is a side view of the hand and arm shown in figure 2. In figure 5 the operator touches the top of the key button with the tips of the first two fingers. The thumb and fourth fingers are at the sides of the button to guide and control it. The operator's forearm in figure 6 is slightly larger than the one shown in figure 4, and therefore more of the muscle rests on the arm support in figure 6. Shirt sleeves have been removed in all of the illustrations.

Preliminary Sending Practice

First sending should start with a series of dits to develop timing and to get the feel of the key. Concentrate on spacing the dits equally. In preliminary practice it is well to copy from a model. Send as smoothly as you can; increase speed as you feel the muscles

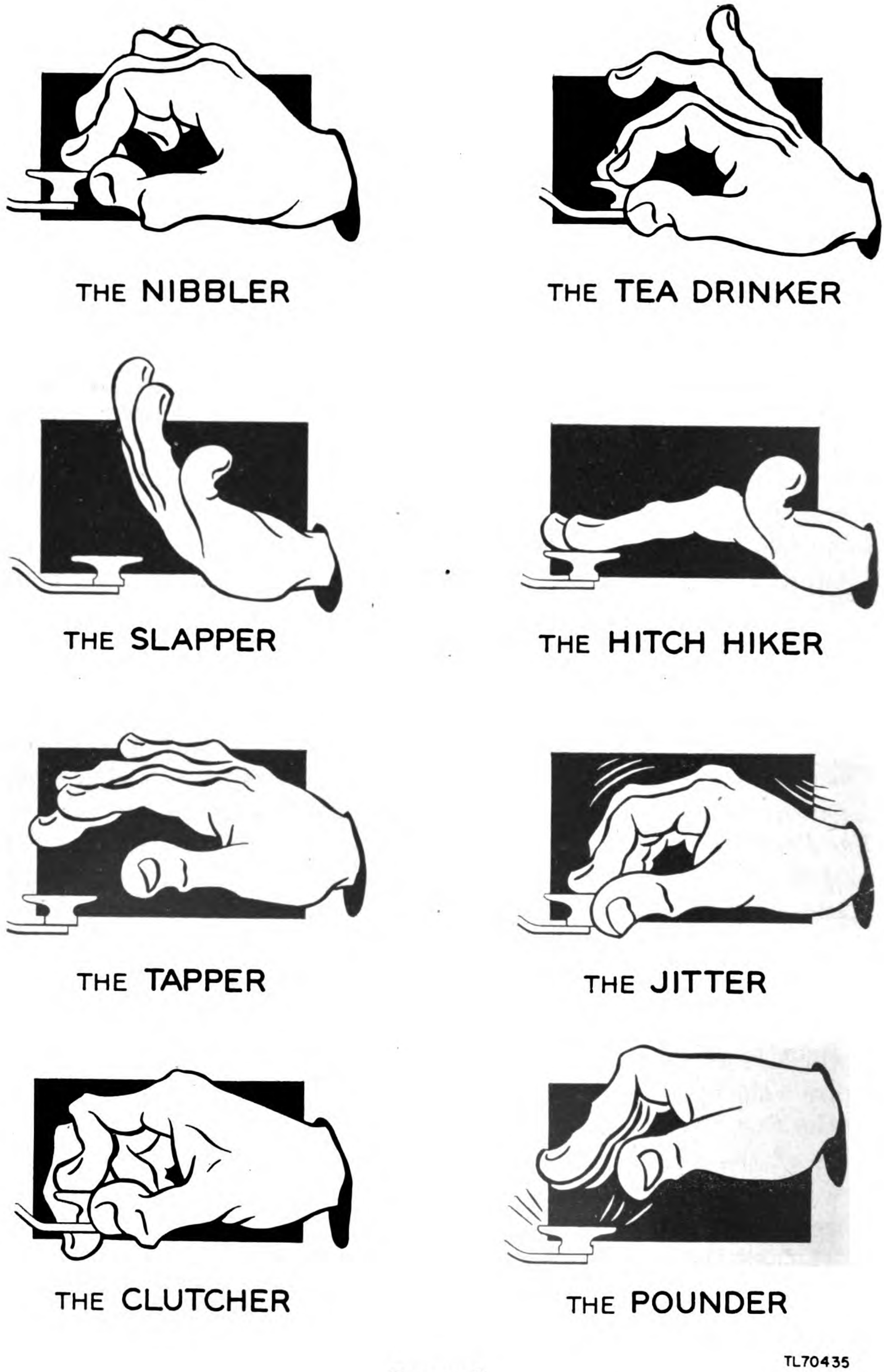

THE NIBBLER
THE TEA DRINKER
THE SLAPPER
THE HITCH HIKER
THE TAPPER
THE JITTER
THE CLUTCHER
THE POUNDER
TL70435

FIGURE 3.

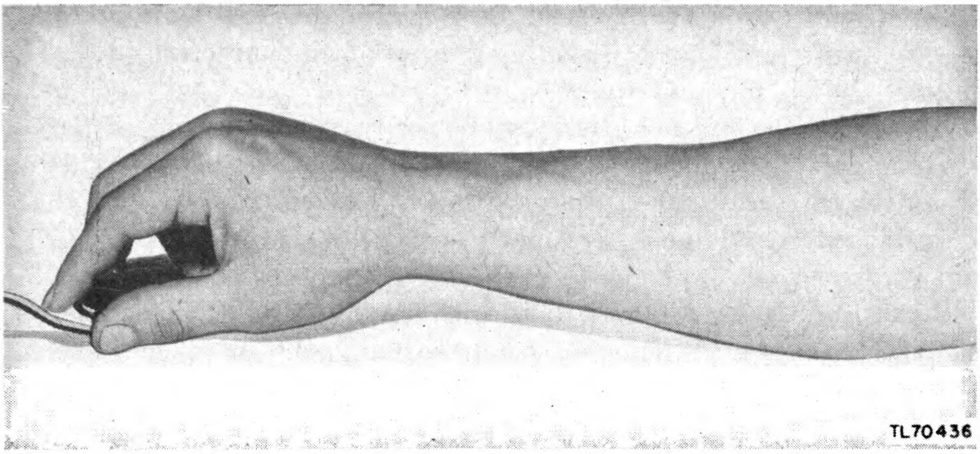


FIGURE 4.

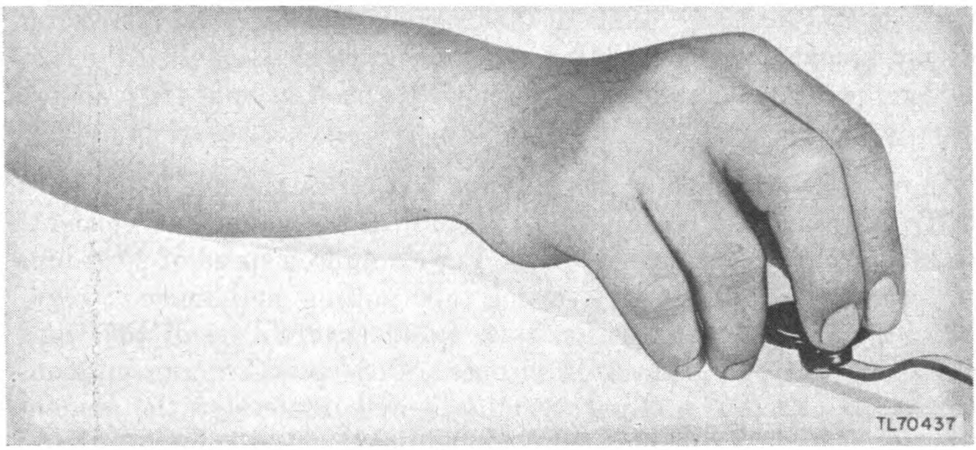


FIGURE 5.

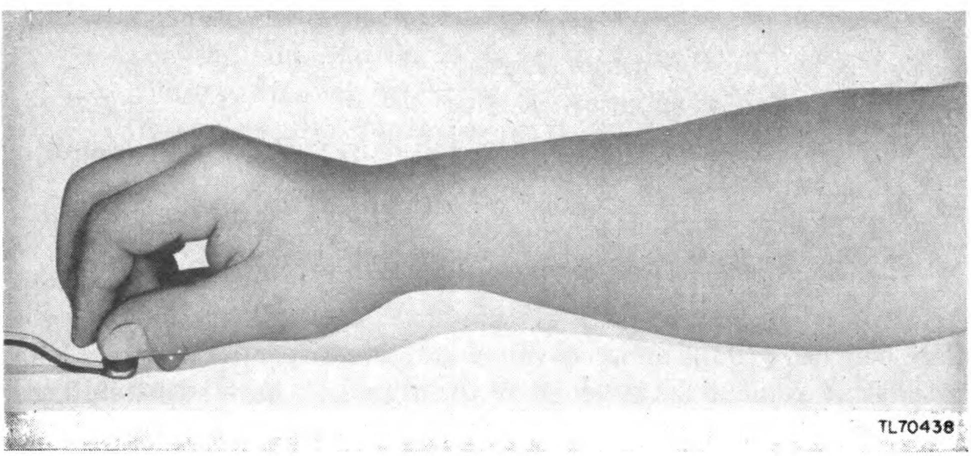


FIGURE 6.

limbering up. Don't try to send too fast; the dits will be rough and tend to "stutter." Then try sending a series of dit characters—I, S, H, and 5.

When the dits are mastered satisfactorily, send a string of dahs, again imitating a good model. The space between dahs should be no longer than the space between dits. When you are satisfied that your dahs are rhythmic and properly spaced, send a series of T, M, O, and Ø

Begin to combine dits and dahs with simple characters such as R, K, A, N, and V. When you have mastered the basic characters, continue your practice to develop speed.

Send to another person whenever possible. The goal you are after is to transmit so that other operators can readily understand what you send.

The morning is the best time to copy code, especially during the early hours. This has been determined through study of teaching methods and learning habits at Army code schools. The hour after the noon meal is not suitable for code signal practice.

CODEZ Standard

In order to standardize practice and test tapes, the five-letter word CODEZ frequently is employed to establish the number of elements in each group at every speed level. For example, a speed of 20 groups per minute is established by setting tape pulling equipment or regulating hand sent transmission to a speed that will send the word CODEZ exactly 20 times in 1 minute. Code practice transmissions sent at 20 CODEZ groups per minute will discourage the student from counting the dits and dahs. The speed is slow enough to make the signal recognizable as one sound unit and is fast enough to prevent the character from "falling apart" during the transmission. At this speed the following relationships exist between the elements of the code character:

(1) The dit is the unit of length.
(2) The dah is equal to three dits.
(3) The space between the dits and dahs within the character is equal to one dit.
(4) The space between characters is equal to three dits.
(5) The space between groups is equal to seven dits.

During early practice at lower speeds it is customary to make the space between groups and between characters disproportionately long so that the student may recognize the signals. As student skill increases the space is decreased until eventually recognition of the character and the group is almost instantaneous.

The Semiautomatic Key

The "bug" or semiautomatic key is used by most amateurs and, in military radio stations, is chiefly employed at fixed stations where operators are required to send for relatively long periods of time.

In sending with the bug, the thumb presses the dit paddle (fig. 7) to the right and the index finger forms dahs by pressing the knob to the left. The key will send successive dits when the paddle is held to the right. During sending, the hand pivots at the wrist; the hand and arm motion is horizontal. Operator comfort, not speed, is the principal advantage and the primary objective in using a bug.

Best operation of the semiautomatic key will be obtained when it is adjusted to make dits and spaces of equal length. Look at figure 7. The top view shows the section of the key between the dah contact adjusting screw and the front stop screw.

Before adjusting, examine the key for mechanical and electrical defects. Make certain that both the *dit and dah contacts* are clean and in perfect alinement with the faces parallel. Make sure that the *lever pivoting screw* is loose enough to permit the lever to move freely; signals will sound unsteady if it is too loose. Examine all supporting parts to make certain that they are firm and steady. Check to be sure the stop screws and locknuts are tight; and, finally, inspect the cord and plug for short circuits or loose connections.

Adjusting the Key

(1) Place the key on a level surface.

(2) Adjust the back stop screw until the reed lightly touches the deadener. Then tighten the locknut.

(3) Adjust the front stop screw until the separation between the end of this screw and the reed is approximately 0.015 inch. Tighten the locknut. A greater separation is permissible if the operator prefers more lever movement.

(4) Operate the dit paddle to the right. Hold the lever in this position and stop the vibration of the reed. Adjust the dit contact adjusting screw until the dit contacts just meet. This important adjustment determines whether the dits will be too heavy, too light, or perfect. The adjustment must be made without flexing the contact spring. Tighten the locknut on the dit contact adjusting screw without disturbing the adjustment.

(5) If the dits are too fast, move the weight located on the reed in the direction of the deadener. If the dits are too slow, move the same weight in the opposite direction.

(6) Adjust the dah contact adjusting screw to a clearance approximating the thickness of the cover on Manual SIG 439–1,

a Department of the Army Field or Technical Manual, or an ARRL Handbook.

(7) Adjust the dit retractive and dah tension springs for the most comfortable operation.

Do not readjust the dit contact adjusting screw unless a complaint is received or unless you are certain that your dits are too heavy or too light. Never change the back stop screw adjustment when the bug is correctly adjusted. It should not be necessary to change the front screw adjustment. However, if the locknut on the front stop screw should become loose, it will be necessary to readjust the dit contact adjusting screw. If the dah contact adjusting screw is too close the dah contacts will remain shorted.

There are some changes which are appropriate and permissible. A change in the position of the weight for the speed of dits or a change in the tension of the retractive and dah springs to suit the individual's requirements will not throw the bug out of proper adjustment.

If the adjustment instructions are followed carefully, the bug will make 25 or more dits before stopping. The first 12 to 15 dits will be practically perfect with the dits and spaces equal.

Once more, the bug is designed to make sending easy rather than fast. Perfect control is more important than speed. Be especially careful to send dits accurately. Not all operators have equally sensitive hearing; characters improperly transmitted on the semiautomatic key will not be understood.

SCATTER SOUNDING

Experiments of two amateur radio operators, Oswald G. Villard, Jr. (W6QYT) and Allen M. Peterson (W6POH) of Stanford, Calif., indicate that employment of a radio propagation technique which they term "scatter sounding" will make it possible to state definitely, following a momentary test, whether two-way radio communication at a given radio frequency to any location within a radius of several thousand miles will be strong, weak, or out of the question.

Villard and Peterson report that "it should be possible not only to establish exactly the correct radio frequency for best transmission to a particular locality, but also to monitor the variations in this frequency from minute to minute throughout a 24-hour period."

Application of this technique, both for military and commercial radio work, should be of value in maintaining constant point to point radio communication.

Details are set forth in a recent issue of QST magazine in an article entitled "Instantaneous Prediction of Radio Transmission Paths."

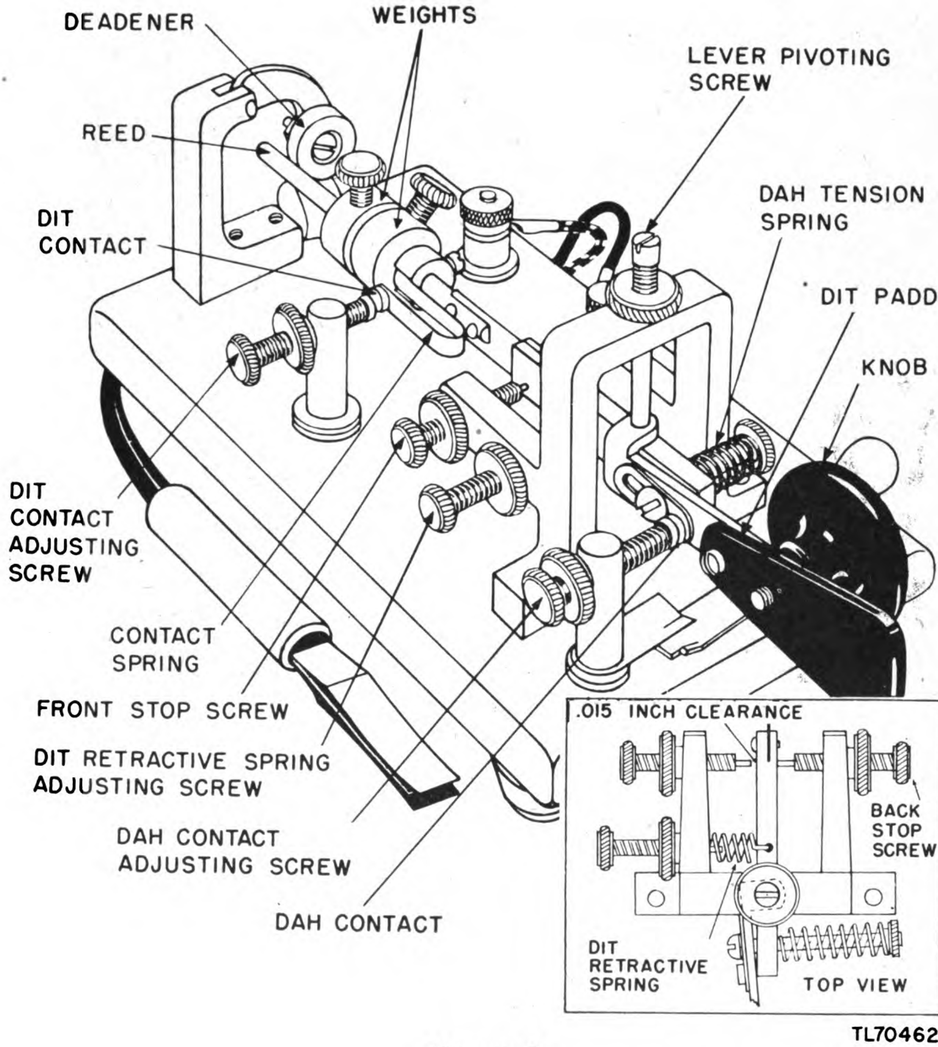

DEADENER
WEIGHTS
LEVER PIVOTING SCREW
REED
DIT CONTACT
DAH TENSION SPRING
DIT PADDLE
KNOB
DIT CONTACT ADJUSTING SCREW
CONTACT SPRING
FRONT STOP SCREW
DIT RETRACTIVE SPRING ADJUSTING SCREW
DAH CONTACT ADJUSTING SCREW
DAH CONTACT
.015 INCH CLEARANCE
BACK STOP SCREW
DIT RETRACTIVE SPRING
TOP VIEW
TL70462

FIGURE 7.

STUDENT AND INSTRUCTOR AT THE SOUTHEASTERN SIGNAL SCHOOL.

LEARNING CODE THE MODERN WAY

The best way to learn a new language is to hear it spoken and to speak it yourself. That also has proved to be the most effective method of learning the International Morse Code. Army radio operators are trained by the phonic or sound system. They learn through listening. Experiments in the high-speed radio operators course in the Signal School at Fort Monmouth, New Jersey, have proven that use of magnetic tape recordings is better on the initial basis of training.

The magnetic system, implemented at Fort Monmouth, is used through the "Z" speeds up to seven words per minute.

Under the normal system schooling at "Z" speeds is 120 hours, whereas the magnetic tape operation takes between 40 and 60 hours.

In addition to being a vital timesaver, magnetic tape recordings eliminate a steady monotony of dots and dashes. The system is phonetic, the letter is announced and the code is given in the background.

The schooling is also interspersed with news releases, information on equipment and further helpful aids.

These methods are employed at the Southeastern Signal School at Camp Gordon, Ga.—where the mass production of Army radio operators is a major occupation.

At Camp Gordon Morse code, recorded on tape, is transmitted to students—more than 2,000 in number—from a single room housing 23 tape recorders. Code is sent at speeds suitable to all students—from beginners, still learning the Morse alphabet to veterans of many weeks who copy 25 groups per minute or more.

The code is transmitted from the recording room to eight classroom buildings on wire circuits. Use of a patch-panel provides flexibility. Normally 21 of the recorders are in use each 50 minute class period. Eight machines are used for testing, eight for practice, and five for beginning students.

Tapes are classified according to groups per minute (GPM). Practice tapes range from 10 to 25 GPM with special 28 GPM tapes held in reserve for advanced students. In the beginners' category tapes are designed to teach students a few letters at a time.

Progress is an individual accomplishment. Students move ahead in the school as fast as they can master the speed tests. Scheduled as a 25-week course, some students have completed the entire assignment in 16 weeks.

Tapes used in the school are made up by instructors. Each is designed to run for an hour. Practice tapes have music interspersed at 10-minute intervals to provide a 2-minute break from the "dah-dit" combinations.

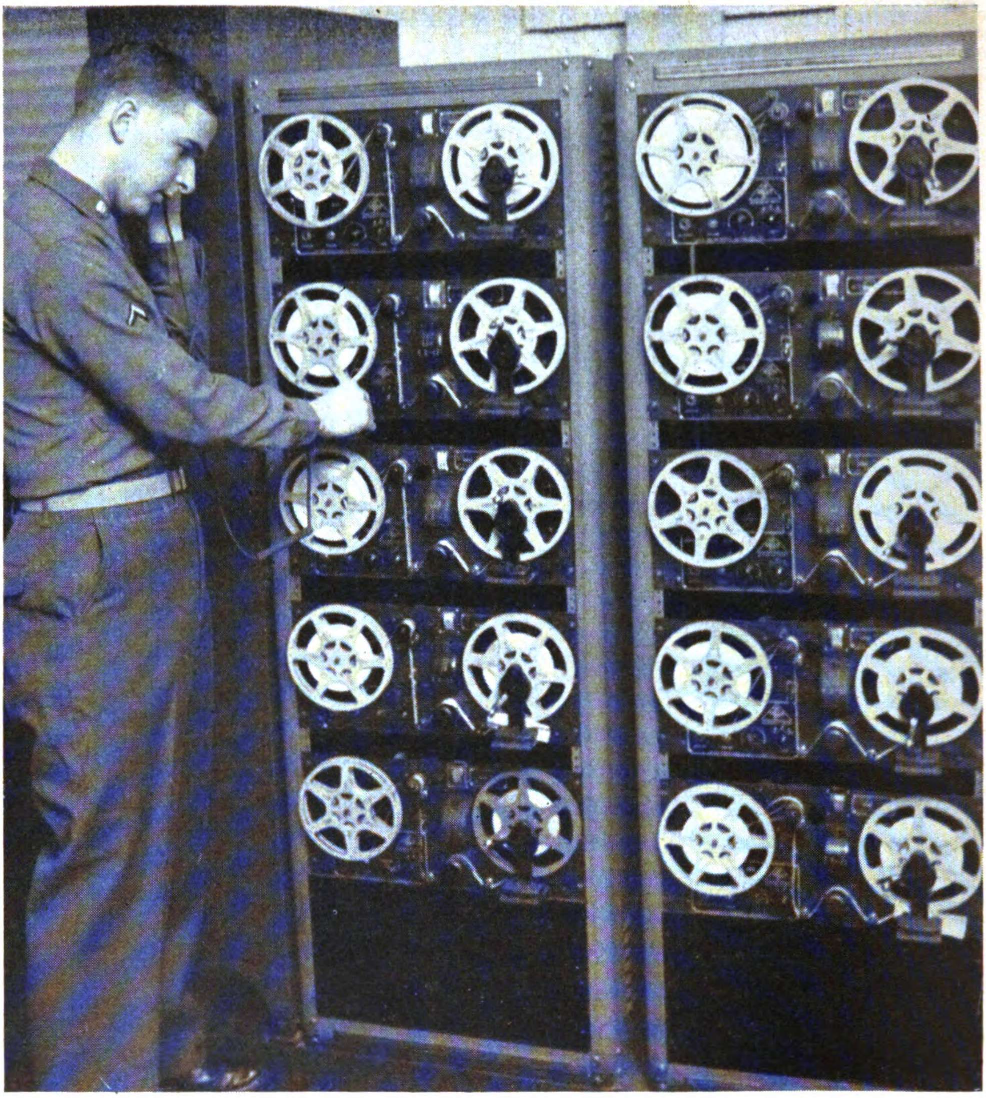
Higher speed tapes include static, interference, and jamming distractions which occupy about 30 percent of the tape. Test tapes are changed every 4 days; four sets of tapes are available at each speed for testing purposes. Students who have trouble getting past a certain speed may hear the same tape for more than a week before it is changed.

All code speeds are fed to each building. Patch panels along each row of desks select the desired speed for that group of students.

In conjunction with the code transmission, a central public address system has been installed for broadcast of announcements, special school problems, and dissemination of general information.

An Army version of the tape recorder helps perfect a student's sending and receiving ability in a different way. Technically known as the TG–10, it employs a photoelectric cell and recording needle that pictures the "dits" and "dahs" for the student, showing him if his spacing is correct.

Students are tested on this machine regularly. They are also re-



A STUDENT CHECKS HIS OWN SENDING.

quired to "read" their own transmissions, played back to them over the headphones.

School officials report this makes the student more conscious of his own sending and helps avoid the commonly heard complaint: "That operator should have to receive his own messages."

COORDINATION BETWEEN USAF MARS AND CANADIAN AFARS

USAF MARS and Canadian AFARS have agreed on a semiweekly schedule between the Headquarters USAF MARS Station AIR and Headquarters Canadian AFARS Station CHT20. These schedules take place between 1100 and 1200 hours EST on Monday and Friday each week. These schedules which were recently established are the first radio contact with Canadian AFARS and will serve as a valuable link in coordinating our two programs and promoting the already friendly relations between Canadian and United States amateurs.

A meeting between the Chief and Assistant Chief MARS, USAF, and representatives from the office of Chief Controller, RCAF Air Force Amateur Radio System was held for the purpose of discussing the affiliation of USAF MARS and RCAF AFARS in the event of a national or international emergency.

At this meeting it was decided that coordination between these two activities would provide extended area coverage for handling emergency traffic to both systems and would also serve to stimulate membership interests in both programs.

As a result of the meeting, additional MARS-AFARS contacts via radio will take place between certain designated MARS stations with the Air Defense Command and Area Coordinators of AFARS. Necessary coordination to complete the arrangements for initial contacts between stations are now in the process of being completed through correspondence between the stations involved.

Contacts between stations will take place on Air Force MARS frequencies which have been allocated to the Air Defense Command. AFARS Headquarters in Canada is presently clearing those frequencies for this purpose.

Information on routing of message traffic to Canada via MARS-AFARS network will be published when final arrangements have been completed.

STUDENTS PREPARE A TV SHOW AT FORT MONMOUTH.

TELEVISION AS A TEACHING AID

Television is helping students at the Army's signal school, Fort Monmouth, N. J., learn the ABC's of complex electronic equipments and systems.

The powerful, close-range lens is of particular use in helping instructors present lessons dealing with small and intricate parts to large numbers of students.

The Signal School has placed into operation a closed circuit video network which carries the program from a central studio on the post directly into the classrooms. There is no interference with commercial programs.

So far, subjects taught over the video network include power supplies, vacuum tubes, antenna demonstrations and operation, and use of test equipments.

One veteran instructor said of the system, "We're able to cover ground more quickly by using TV. . . . It's hard work preparing interesting video lessons, but the results are worth it."

Students also serve as cameramen, lighting experts, producers, directors, trouble shooters, and repairmen.

TEXAS TWINS AND MARS STATION AID AIR FORCE RESCUE MISSION

Twin brothers of the Signal Corps ROTC unit at Texas Technological College, Lubbock, Tex., have been commended for assistance in an air force rescue mission, according to Maj. Victor B. Penuel, Jr., Signal Corps, Assistant Professor of Military Science and Tactics.

Major Penuel has received the commendation from the MARS Director of Edwards Air Force Base, Edwards, Calif., for assistance furnished by Texas Tech MARS Station K5WAT in relaying emergency traffic to and from mobile W6VRF (American Radio Relay League Emergency Coordinator) and K6FAJ (Edwards Air Force Base). Operators at K5WAT during this emergency were Walter B. and David W. Massengale, twins. Both are juniors at Texas Tech. Both are cadet Master Sergeants and platoon sergeants of the Signal Company.

WALTER B. AND DAVID W. MASSENGALE.

The mobile unit (W6VRF) was the only means of communication between a search party from Edwards Air Force base and its home station. Propagation characteristics were such as to preclude direct radio contact. K5WAT was the relay station.

On 15 January 1952 personnel operating a remote radar station of the Engineering Laboratory at Edwards Air Force Base (located more than 100 miles from the base) departed for their home station in a snowstorm. The mountain roads were icy. Their vehicle failed to make a turn and plunged over a precipice. One airman was killed, another severely injured. The third man managed to drag his wounded companion to an old mining camp, then climbed back to the radar site to radio for help. A rescue mission departed Edwards Air Force Base 16 January 1952, accompanied by W6VRF/mobile. The mission was accomplished in approximately 6 hours. Radio communication was maintained throughout the operation through the effective operation of the Signal Corps twins from Texas Tech.

ADVANCED HF COMMUNICATION METHODS

Crosby Laboratories personnel recently visited the Signal Corps Engineering Laboratories to record samples of ionospherically propagated multiplex single sideband teletypewriter signals. These signals were transmitted from The Presideo, San Francisco, for reception at Hawaii and were intercepted at the Swimming River Receiver Site near the SCEL in New Jersey by means of a rhombic antenna oriented to maximize its pickup on the back wave of the transmitting antenna. Detected signals were fed back to the terminal equipment at the Labs by means of a wire land line. After separation, by the terminal equipment, of the diversity and normal tones present in the detected signal, the two sets of tones were recorded on a magnetic tape. The contractor now has available samples of ionospherically distorted signals which can be used to check, under actual field conditions, the operating characteristics of newly designed diversity combining circuits being developed under Department of the Army Signal Corps contract.

BRIGADIER GENERAL TOM C. RIVES, USAF, RET.

MARS FOUNDER HEADS ELECTRONIC CENTER

Tom C. Rives, Brigadier General, USAF, retired, and founder of the Army Amateur Radio System (AARS), has been named manager of the General Electric Advanced Electronic Center at Cornell University, Ithaca, N. Y. General Rives will retain his office at Electronics Park, Syracuse, N. Y.

The center will carry on advanced studies in electronics, infrared and the related sciences. The center proposes to specialize in systems studies on guided missiles, radar early warning systems, and proximity fuses. The present Cornell faculty will be drawn upon for consulting service in engineering, physics, chemistry, mathematics, psychology, etc. Faculty appointments, without tenure, as professors and associate professors, will be given selected members of the GE staff at the center. This personnel may be used to teach graduate classes in the university.

The center, located in a modernized hangar building at the Ithaca airport on university property, already has scientists at work on one Signal Corps and two Air Force projects.

The spiritual founder of MARS gave the military-amateur organization a pat on the back in his announcement of the Advanced Electronic Center goals. He said, "We all hope that this new Advanced Electronic Center will prove as valuable to the national defense as MARS, the worthy successor of the AARS."

General Rives was asked to furnish from his intimate acquaintance of the period some data about the establishment of the AARS. Here, in his own words, is the story.

"The idea of affiliation between the Signal Corps, United States Army, and the radio amateurs started in the early part of 1925. At this time I was in charge of the Radio Section, Enlisted Department of the Signal School, Camp Alfred Vail (now Fort Monmouth, N. J.). Maj. George L. Van Deusen (now Maj. Gen. George L. Van Deusen, U. S. Signal Corps, retired and president of RCA Institutes, Inc.) was commandant of the Signal School. Col. John Ezra Hemphill was Commanding Officer, Fort Monmouth.

"My mission in the school was to train radio operators and radio mechanics. We could not train them fast enough to supply the demand. Very few of them remained in the service for a great length of time. It was apparent that something should be done to create a reservoir of good radio operators that could be called upon in the event of an emergency. It was natural for me to think of the radio amateur since I had been one for 10 years. I got my first operator license in New Orleans, La., in 1915, after which I helped construct and operate the first amateur radio station at the Alabama Polytechnic Institute in Auburn, Ala. It was a 2-KW rotary spark gap outfit and we used silicon detectors in those rock-crusher days.

"Major Van Deusen approved discussion and directed that I write up a story that could be sent through channels to the Chief Signal Officer. After about twenty rewrites of the proposal, Major Van Deusen and Colonel Hemphill were satisfied with it and forwarded it to the CSO for approval.

"The Chief Signal Officer approved the idea and Lt. Col. Frank Griffin of Legal Division, OCSigO, and I were sent to the Headquarters of the American Radio Relay League to discuss terms of an agreement. ARRL was selected since it appeared to us that they represented the majority of the amateurs and could reach a large number of them through QST magazine.

"My recollection is that Mr. Hiram Percy Maxim, Jr., ARRL president; Mr. K. B. Warner, Mr. F. E. Handy and others represented the amateurs at the meeting. They were careful to protect the interests of the amateurs and jealously guarded their rights to certain frequency bands. When they saw that we were not trying to hurt the radio amateur but were really interested in his becoming a member of the National Defense Team, they gave us their unstinted cooperation.

"In the October 1925 issue of QST the new agreement between the Chief Signal Officer of the Army and the American Radio Relay League was announced. The infant organization suffered the usual growing pains, aggravated by 'lack of funds.' We scraped up some

salvage and surplus equipment around Hangar No. 1 at Camp Vail and got an appropriation to construct a small building and put up an amateur radio station to assist in training operators at the Signal School. We urged the necessity of this quite strongly since we were unable to simulate 'interference' on our wire nets in the code room. The War Department Radio net helped, *without knowing they were doing so*, by saying that our best 20-word graduates could only handle 10 words in the War Department radio net where interference was generally severe. We claimed that the congestion in the amateur bands was so great that working in these bands gave great interference and very valuable practice. As a result of this, the first Army Amateur Radio Station—2CXL—was born. It was a Master Oscillator Power Amplifier set using a 5-watt VT-2 as the MO and a 50-watt VT-4 as the power amplifier. It operated into a split vertical dipole antenna supported by stand-off insulators on a telephone pole. As I remember Sergeants White, Cubrero, and Voight did most of the work constructing the set and station. We all operated the station and used many of the enlisted students as operators.

"My direct work with the amateur stopped in June 1926, when the Chief Signal Officer decided to 'educate' me by sending me to sit at the knee of Prof. H. M. Turner at Sheffield Scientific School, Yale University, to study transient visualizers, three electrode tubes, and quartz crystals. Other members of that class (1926–27) included: First Lt. Victor A. Conrad (now Brigadier General, Signal Corps), Second Lt. Ray Maude (now Major General, USAF), Second Lt. Francis L. Ankenbrandt (now Major General, USAF), Second Lt. William P. Corderman (now Colonel, Signal Corps) and Second Lt. William L. Bayer (now Colonel, Signal Corps).

"When I completed the course at Yale, I was sent to the Philippine Islands where I had the pleasure of operating KA-1HR at Fort McKinley. This station was started by another old timer—First Lt. Haydn P. Roberts, who later became a Colonel in the Signal Corps and now is retired. While I was in the Philippine Islands (1927–30) the station was run by the Philippine Division Signal Company under Capt. Robert A. Willard (now Brigadier General, Signal Corps).

"Upon my return in 1930 I went to duty as Officer-in-Charge of the Signal Corps Aircraft Radio Laboratory at Wright Field, Dayton, Ohio. Between May 1930 and June 1936 we made many aircraft radio test flights in which amateurs throughout the United States cooperated.

"From this first tour at Wright Field I went to the Air Force Tactical School at Maxwell Field, Montgomery, Ala., and then to the Army Industrial College in Washington, D. C. In 1937 I joined the Research and Development Division, Office of the Chief Signal Officer, and was on that job when World War II began. In the early part

of 1942, due to urgent appeals from Major General Andrews in Panama and many others, I recommended strongly that the Army buy up all the amateur radio equipment they could find in good condition and use it for communications work until such time as standard equipment could be procured. This recommendation was approved and Maj. Roy D. Jordan, Signal Corps (now with General Electric Co.), spent many months inspecting and buying from the amateurs their best transmitters and receivers for the use of the United States Government. Roy Jordan tells me the amateurs cooperated fully and parted with their beloved transmitters and receivers with tears in their eyes. Roy also says $9,000,000 was allocated to the project at the start but he is not sure as to the total actual expenditure. We do know that the amateur radio equipment was all that we had for communication purposes at many important posts for a year or more after the war started.

"My next contact with the amateurs came in July 1948 when I was again on duty at Wright Field in Dayton, Ohio. At that time, by contract with the Goodyear Co. and the Boeing Aircraft Co., a C-54 airplane had been modified so that *all* of the antennas were completely enclosed inside the structure of the aircraft. The British were very much interested in this project and Mr. Fred S. Barton, Director of Research, Ministry of Aircraft Production, requested that we fly the airplane to London for their inspection. This was approved by the Air Force authorities and in July 1948 we flew the C-54, with a party of 24 scientists and engineers, to London and return. Col. Albert Boyd, USAF, Chief of Flight Test, Air Matériel Command (now Brigadier General, USAF), was pilot and Mr. L. B. Hallman, Jr., Chief Engineer of the Communication and Navigation Laboratory of the Electronic Subdivision, Wright Field, was the radio operator for the flight. Hallman maintained solid contact with United States amateurs on the flight over and back using what the British called the "submerged aerials." At one time, on the way over, Hallman held a three-way conversation with amateurs in England, France, and the United States.

"I retired in 1949 and went to the University of Illinois for 10 months as Special Associate Professor with the Electronics Engineering Experiment Station. In 1950 I joined the staff at Electronics Park.

"I am sure that after this you will disagree with General MacArthur's statement and agree with me that, 'Old Generals never die or fade away but they do reminisce.' "

METROPOLITAN SPECIAL EVENTS

Special events in the New York City and Jersey City area have kept the MARS Directors at First Army Headquarters and Headquarters Continental Air Command busy since the first of the year.

First Army Headquarters asked Lt. Edward J. Minkel, First Army MARS Director, if he'd like to present a demonstration in space available for Recruiting Service at the National Sportsman and Vacation Show held at Grand Central Palace, New York City, in February 1952. The answer was an emphatic "Yes, sir!"

So a joint Army-Air Force MARS exhibit went on display at the Sportsman Show. A land line teletypewriter circuit was established between Grand Central Palace and A2USA on Staten Island. Messages taken at the Palace for delivery to Armed Forces personnel were relayed via land line teletypewriter to A2USA and then sent by radio. Two operators from First Air Force brought some additional equipment from Mitchel Air Force Base and assisted with the demonstration. A receiver at the display booth was tuned to 4020 kc so visitors could hear their messages when they went out on the air. Dave Talley (A2PF) helped man the booth the first day. Captain Richardson (AA2WAO licensee) sent two operators from his Fort Dix station (PFCs Schwartz and Jordan) to help.

Mr. Joseph Foley, Sergeant West, Mrs. Foley, and Lieutenant Minkel chat before the "Careers Unlimited" television show. The Foleys sent greetings to their son in service during the telecast.

STATION A2NUI PORTABLE IN THE FULTON THEATER LOBBY.

Careers Unlimited

First Army MARS also took part in a TV show on Channel 5 (Dumont). A live radio station (A2USA portable) was set up on the Dumont TV stage in New York City and operated during a 15-minute program.

Operation Fulton

Previously, MARS had been active in making Jersey City's "Operation Fulton" a success. The MARS mission was to assist Civilian Defense, Red Cross, and other Disaster units in Jersey City in their drive for blood donors. A live station was set up in the lobby of the Fulton Theater in Jersey City (A2NUI) and operated portable. Jack McGrath (A2NUI) and Ed Watson (A2BAX) did the planning for this demonstration.

The exhibit was in conjunction with the showing of the film "Fix Bayonets." Fifth Korean veterans were present. Commanders of veterans organizations participated; the Police Athletic League band serenaded. Pieces of Army equipment, including tanks and moblie radio stations (SCR 399) were displayed. Any patron who donated blood to the Red Cross was admitted to the theater free of charge. Message traffic was transmitted from the theater lobby to A2USA who then effected relay to servicemen all over the world.

Part of the staff of volunteer workers for "Operation Fulton." The potential utilization of MARS facilities as a dynamic "showcase" to assist Red Cross, Civil Defense, and Service Recruiting programs is suggested here. MARS Headquarters and MARS Command Directors will assist local planners wherever possible.

John Vitale (A2IIN) of Elizabeth, N. J., set up and operated a similar net from the Liberty Theater in Elizabeth. (2IIN was instrumental in organizing a communications net on the scene of the first of the recent airplane disasters in Elizabeth.)

A5QNL/W5QNL.

DX ON TWO METERS

In the face of rapidly changing conditions and broken records it is difficult to know accurately who holds the present world's record for two-way radio contact on 144 megacycles (two-meter band).

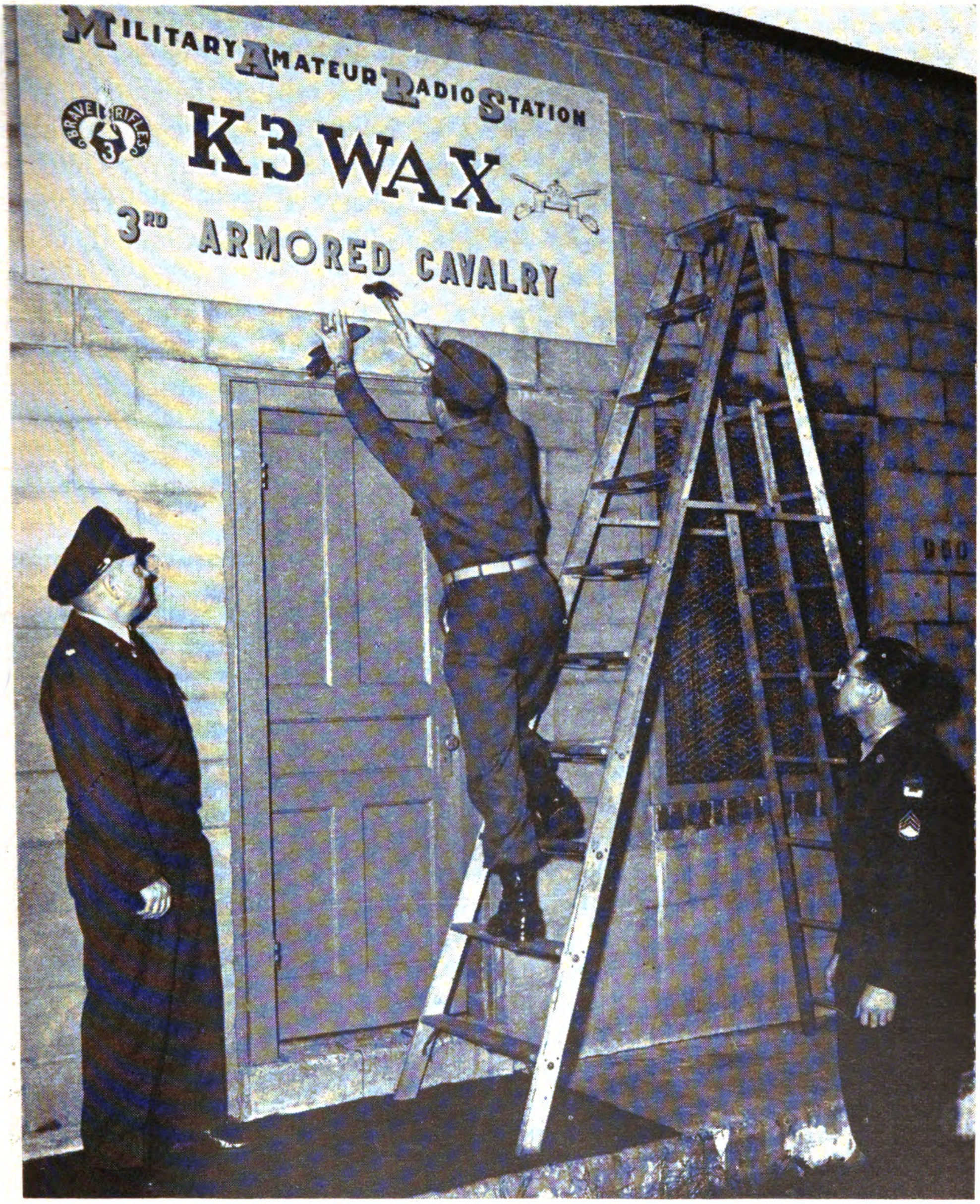
From latest records on file with MARS Headquarters a MARS member—Master Sgt. Clarence E. McCardie, radio repairman of the Signal Branch, Red River Arsenal, Tex.—holds the record at present. From his home station (W5QNL) in West Hooks Courts near Texarkana, Tex., Sergeant McCardie established two-way contact with W6ZI at Glendale, Calif.—a distance of 1,390 miles.

Following this contact, Sergeant McCardie reports he was swamped with telephone calls, telegrams, and letters from other amateurs who wanted additional information. Reception over 200 miles is considered a rare event. The previous record is believed to have been held by W5VY of San Antonio, Tex., and W8BFQ for contact of approximately 1,100 miles.

AA3WAX SERVES 3D ARMORED CAVALRY

MARS Station AA3WAX, a Second Army station, was officially opened in November 1951, to serve the 3d Armored Calvary Regiment. The station was dedicated by Col. James O. Curtiss, Jr., regimental commander, at special ceremonies. The station equipment includes four transmitters and four receivers.

In addition to MARS frequencies, complete coverage is available on the 80-, 40-, 20-, 10-, and 6-meter bands. The main transmitter is a BC



COL. JAMES O. CURTISS, JR., HANGS OUT THE SIGN.

610. K3WAX call letters are utilized for amateur transmissions. The station operates both phone and CW.

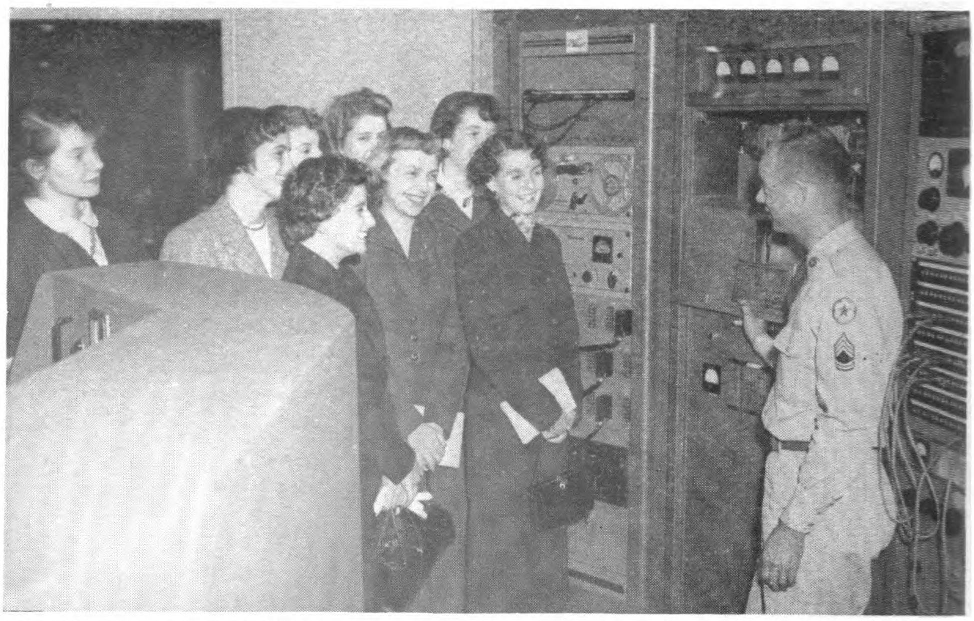
Primarily, the station offers a fast, economical means of communication with detached elements of the 3d Cavalry. In an emergency, this service would be of top importance.

K3WAX will be used to train personnel and to broaden their experience in practical, military radio communication. It will provide a recreational facility for amateur operators in the unit and men who are interested in studying for the amateur license. Theory and code classes are planned.

In charge of the station is Sgt. Stuart Robinson, Signal Supply Sergeant. Maj. Lloyd A. Perkins, regimental communications officer, Pfc. Robert Whitney, Pfc. Robert Funk and Sgt. Frederick Way (since released from the Army) also helped establish the station.

Present for the dedication of AA3WAX at Fort George G. Meade, Md., were Lt. Col. C. A. Hickey, Second Army Signal Supply Officer; Jack H. Gibson, regimental executive officer; Charles W. Calvert, commanding officer of the 3d Battalion; Thomas MacConnell, commanding officer of the 1st Battalion.

Maj. Cyrus R. Shockey, regimental S3 (plans and training); Maj. Arthur C. Fuller, post signal officer; Maj. Reaford L. Robinson, executive officer of the 1st Battalion; Capt. Dale R. Bushey, MARS Director for Second Army; and Warrant Officer (JG) Willie J. Benton, Unit Administrator of Regimental Headquarters Company, also participated.



STUDENTS FROM TRINITY COLLEGE, WASHINGTON, D. C., VISIT K4USA.

TRANSISTORIZED TELETYPEWRITER CONVERTER

The first completely "transistorized" Army electronic device, a teletypewriter converter unit performing functions similar to conventional converters now in Army use was demonstrated at the Pentagon in Washington, D. C., by engineers from the Signal Corps Engineering Laboratories, 29–31 January 1952.

Presaging a wholly new approach to the design of military communications equipment by completely eliminating vacuum tubes through the use of transistors, this experimental unit effects a considerable reduction in weight and size. The "transistorized" unit weighs 10 pounds and has a volume of 0.4 cubic feet compared to 220 pounds and 7 cubic feet for the CV–31, and 30 pounds and 1 cubic foot for the CV–115 (equipments now in use). Even more important, power consumption has been reduced to 1.65 watts, a hundred-fold reduction over the CV–31 and CV–115, thus permitting use of small standard Signal Corps dry cells in place of the previously required 110-volt a-c source. Other major advantages resulting from use of transistors in electronic equipment are increased ruggedness and life-expectancy.

Development of this experimental laboratory model was accomplished at SCEL under the Signal Corps transistor program aimed at eventual large-scale application of transistors in military electronic equipment. The converter performs the function of transforming frequency-shift signals from the IF amplifier of a radio receiver to d-c pulses for actuation of a teleprinter and includes many circuits encountered in typical radio communication equipment, such as amplifiers, oscillators, mixers, limiters, discriminators, and switch circuits, all designed around transistors. As far as is known, this is the first working equipment in which transistors have been interchanged and replaced without the necessity of circuit changes to compensate for transistor characteristic variations.

RADIO RANGING IN OUTER SPACE

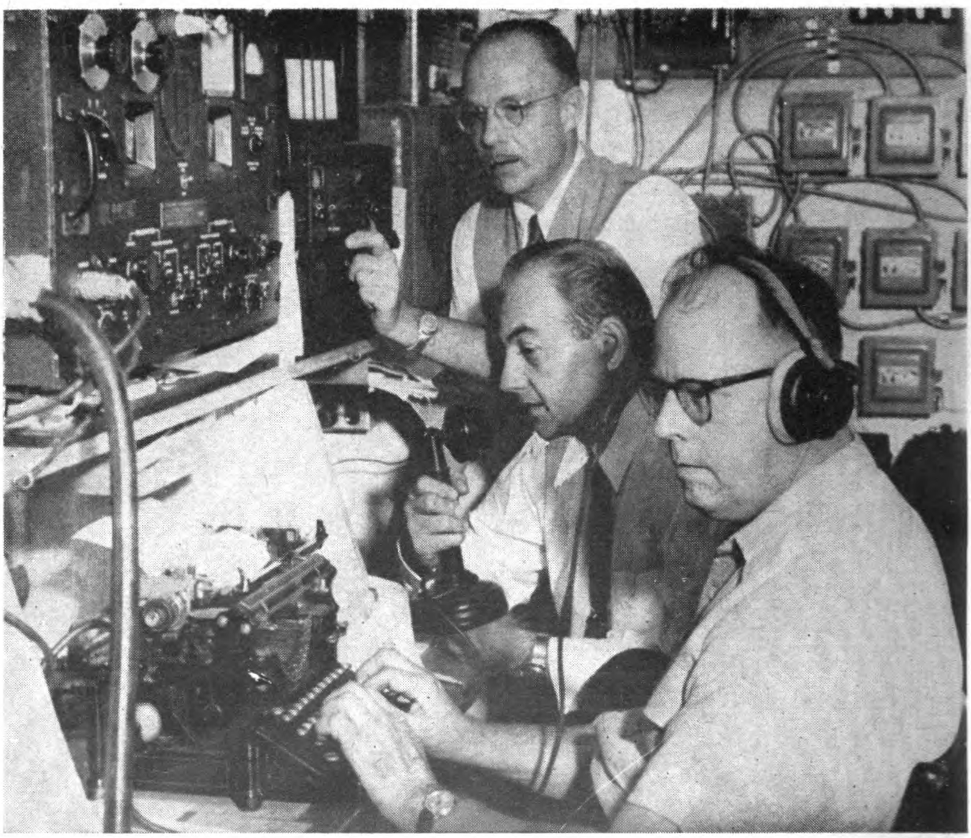
A method of radio ranging to provide essential trajectory, velocity, and distance data for guidance of interplanetary rockets was described recently by Dr. M. J. E. Golay of the Signal Corps Engineering Laboratories in an invited paper presented before the New York Chapter of the American Rocket Society.

NOMAD NET ON WHEELS

A mobile MARS net is in operation in the greater Chicago area. The net meets 1 night a week on frequency 27994 kc. Additional time is expected to be given the net as membership and activity increase.

The net control station is A9JGL (Spencer Allen, 7522 Ridge Avenue, WGN–TV news director). Alternate net control is Clarke W. Peterson of 1725 Wilson Avenue (A9SH). A subbase station, A9QN, Fred W. Collins, operates from Des Plaines to offer further flexibility to the net. A9USA, Fifth Army Headquarters, is established as the base radio station.

Many additional members probably have joined the net since the net was reported to MARS Headquarters. In its early stages the membership included John Disch (A9VEZ), Robert Nelson (A9EXG), George Schreiber (A9YIX), Karl Michael (AØKHJ), Frank Hughes (A9KJ), Felix Kubik (A9MRK), Morris G. Towler (A9ZJU), Robert Baird (A9NN), Robert Burnet (A9NHD), and of course the control stations listed above.



A9SH (REAR), A9JGL (AT PHONE) AND A9QN AT THE DES PLAINES SUBBASE STATION.

U. S. GOVERNMENT PRINTING OFFICE: 1952


W7M
Swan Island, West Indi
KS4A
PUERTO RICO
KP4KD
GARDEN CITY, MICHIGAN
W8GWA
Pse Qsl Tnx
WIESBADEN GER
(US ZONE)
DL4
W5N
ary Amateur Radio System
7WAT
Ft. Lewis, Washington
W3NLS
4KEH
VIRGINIA
M SGT GEO R FOREMAN
Trieste United States
GERMAN
AMATEUR-SHORTWAVE STATION
Great Falls Air Force Base, Montana
TNX QSL PSE
VIA DARC
MUNICH 27
W7LQN
Confirming QSO
S/Sgt. George L. (Lee) Wilkinson
QSL Via C. B. Mills, RFD 2
Box 7, Sonoma, California
W4SR
SANFORD, VIRGINIA
PORT CHESTER,
U.S. ARMY FORCES, ANTILLES
PUERTO RICO
VIENNA
City on the
Danube.
VETERAN'S RADIO CLUB
BALTIMORE 24, MARYLAND, U.S.A.
W3OEU
W4MB
CM8MN
FRANK McAINSH
KINRARA
CRIEFF
KZ
W9Y
Wiscons
VP9
NELSON MA

MARS BULLETIN

MARCH 1953
Vol. 4 No. 1

Military Affiliate Radio System

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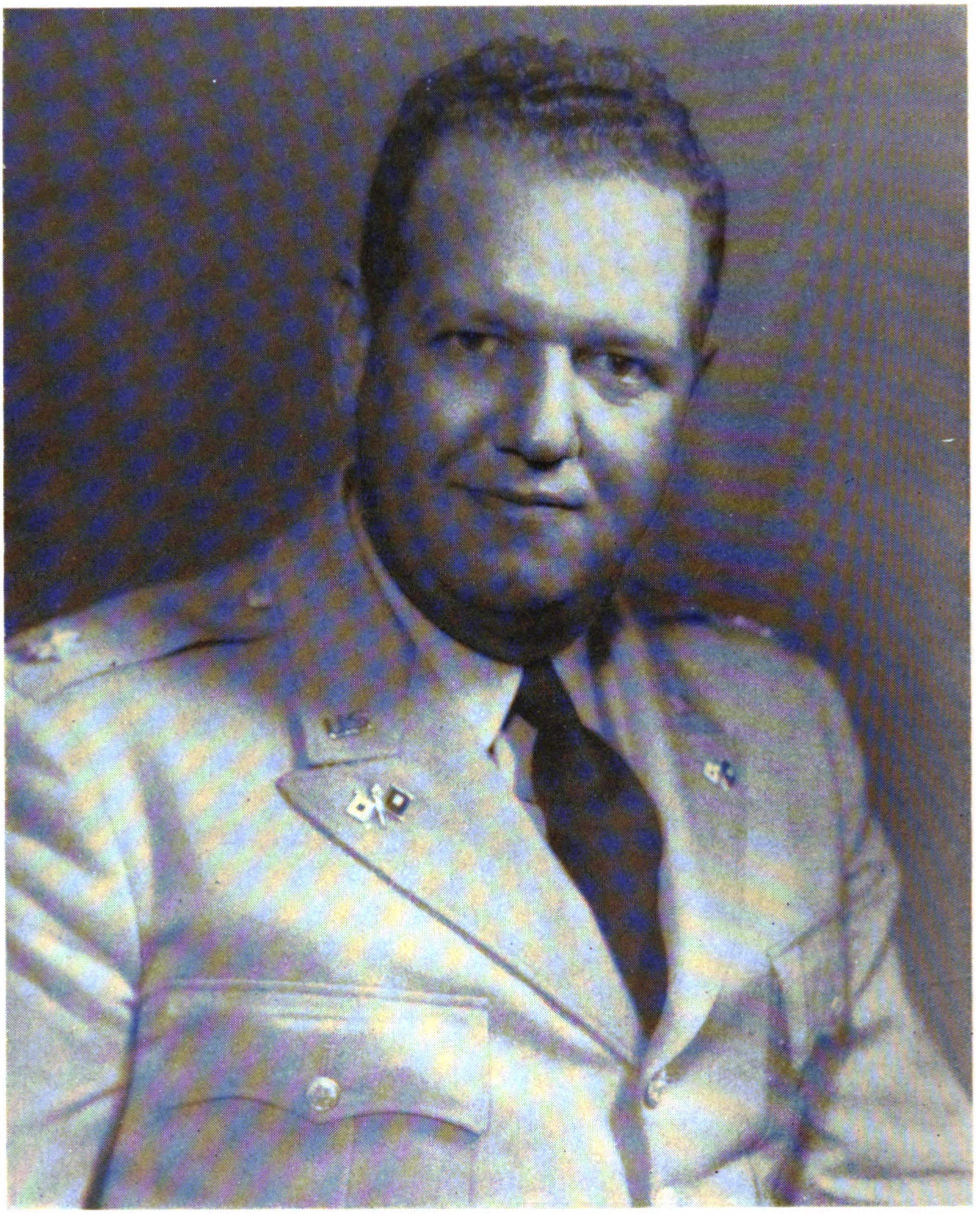
PENTAGON BUILDING, WASHINGTON, D. C.



A3UWI: Chief, Mars (Army).

MARS BULLETIN

March 1953

Volume 4 Number 1

ABOUT THE COVER: Mars *Air Force members of the metropolitan Washington, D. C., area have frequent mobile exercises which include both military and civilian participants. The Pentagon Building is a popular rendezvous point.*

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CQ . . . CQ . . . CQ . . .

The Military Affiliate Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control. The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members. It will be prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to: The Editor, The MARS BULLETIN, Room BE 1000, the Pentagon, Washington 25, D. C.

EDITORIAL

By Major Charles C. Mack (USAF)
Chief, MARS (Air Force)*

Two recent changes have been made in the MARS Program. The program has a new name, and the Army MARS has a new Chief.

The change in name does not affect MARS operations. Qualification for membership still is predicated on possession of a valid amateur radio operator license. Methods and procedures approved for MARS operations still are rooted in the Joint Army, Navy, Air Force Publications (JANAP). However, the new name—Military Affiliate Radio System—does indicate some of the broader aspects and concepts of the proposed use of the system to augment military radio circuits. While many of us are reluctant to part with the word "amateur" as part of our system title, the fact remains that it is a departure affecting plans only; our operations and our cooperative associations with other amateur radio services will continue as effectively, and we hope as amicably, as they have in the past 4 years.

The new Army Chief, MARS is Maj. James A. Long (A3UWI) who has been a leader in the MARS program since its activation in 1948. The MARS is happy to welcome Major Long to the new assignment.

A3UWI comes to the Pentagon from USARPAC where he was Theater MARS Director. He replaces Capt. Lester A. Peterson (A4YCV) who has moved to a new assignment in Alaska.

Close cooperation between the Chiefs, MARS has contributed greatly to the success of the program.

Captain Peterson, during his tour as Chief, MARS (Army), set a high example of Service cooperation for his successor. Early indications are that Major Long will prove to be equally cooperative. Making a joint operation work is a job requiring day-to-day coordination and decisions. The Chiefs, MARS truly represent unification in action.

Welcome, Major Long. It will be a pleasure working with you.

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*Prior to publication Major Mack has departed for an oversea assignment. His successor will be welcomed in the next issue of the MARS BULLETIN.

MOBILE SERVICE IN WASHINGTON

AF3TMM and AF4PXI check out a TCS–12 transceiver modified for 10-meter operation.

The Air Force Washington, D. C., Mobile Radio Net started a year ago with 16 members and a goal to provide normal and emergency communication service within and around the strategic area of Washington, D. C.

A surprising feature of the net is the number of mobile members assigned who are active in every drill. With fixed stations, the mobiles form a chain around the Washington area.

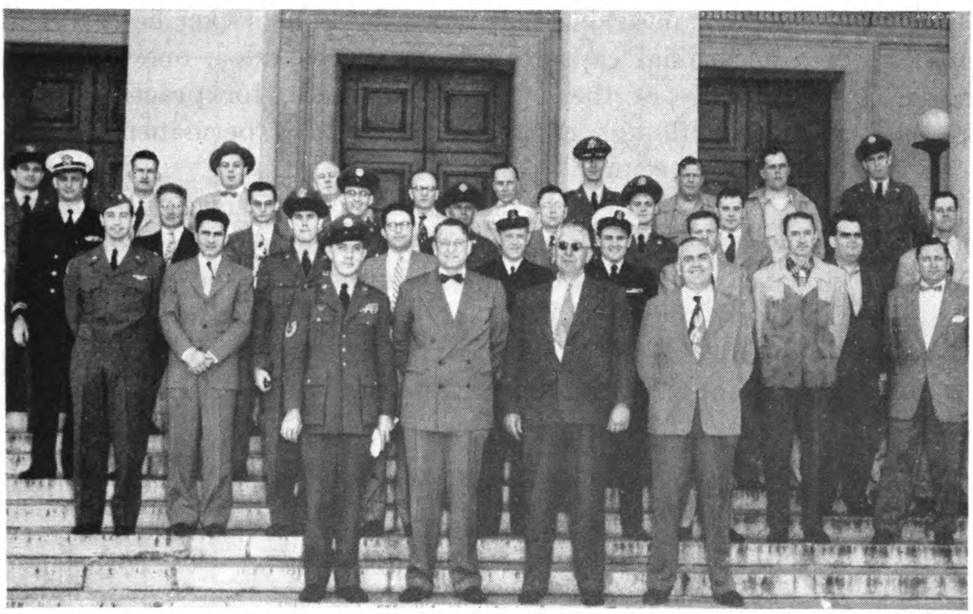
During routine drills, two fixed stations act as Net Control, one on 3307.5 kcs. and one on 27994 kcs. However, during simulated or actual emergencies, the mobiles act independently with the assumption that commercial power has been cut off. The net manager for each of the 'phone nets is a mobile member.

The master control station AIR/K4AF is located at the Pentagon; fixed stations provide the long haul communications and relays, when necessary. Each net night one mobile station is directed to rendezvous with a designated CW station and act as liaison between the three nets which are operated simultaneously.

A recent simulated emergency operation conducted by local military organizations and the Washington Amateur Radio Club was termed highly successful by the Chief, MARS (Air Force).

Area coverage maintained by mobile and fixed stations includes Montgomery and Prince Georges Counties, Maryland; Washington, D. C.; Fairfax and Arlington Counties, Virginia; and the city of Alexandria, Virginia.

Washington area MARS mobiles rendezvous at the Pentagon Building for a week-end exercise.



A Sunday turnout of Air Force MARS members in the Washington area.

EXACT FREQUENCY OPERATION OF THE VIKING I

It has been reported to the Chief, MARS (Army) that when the regular FT-243 MARS-issue crystal units are used in the Viking I radio transmitter, the output frequency has been found to differ from the rated frequency of the crystal by from 1 to 2 kilocycles.

According to a letter from the manufacturer, the crystal should be ground and calibrated for the Pierce oscillator circuit that is incorporated in the transmitter in those cases where the Viking I is required to operate on an exact frequency.

The manufacturer advises, "In cases where crystals for the exact frequency are on hand but are ground for use in an oscillator circuit other than the Pierce, the transmitter may be modified as shown in the attached alternate oscillator circuit diagram." (See fig. 1.)

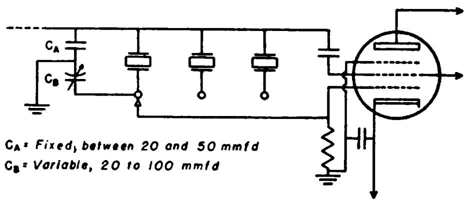


FIGURE 1.

"Addition of capacitors C_a and C_b changes the oscillator circuit to that of an electron-coupled Colpitts for the one crystal socket to which they are connected. C_b may be variable so that individual crystals may be calibrated against a secondary frequency standard. If it is necessary or desirable that more than one socket be reserved for this use, additional capacitors C_b may be added, one for each socket. The balance of the crystal sockets are, for practical purposes, unaffected although capacitor C_a remains permanently connected from grid to ground."

Using units are authorized to make this oscillator circuit modification when such is necessary for operation within frequency tolerance. When this modification has been made, a permanent-type notice should be posted inside the transmitter cabinet indicating which crystal sockets have been altered for Colpitts type operation. This modification data also should be entered in the Viking I instruction book.

A CRYSTAL OSCILLATOR ADAPTOR FOR THE SIGNAL SHIFTER

By Richard A. Gilson A3NQA

The Meissner deluxe Signal Shifter used by many MARS stations has the one disadvantage of not being adaptable for crystal operation without the addition of a crystal oscillator stage. The advantage and the necessity for crystal operation on "spot" net frequencies should be apparent to any active MARS member. The modified Pierce oscillator described in the December 1951 issue of the MARS BULLETIN for use with Collins PTO exciters may readily be arranged for use with the Signal Shifter.

The crystal oscillator adaptor in use at A3NQA and illustrated schematically in figure 1 differs from the A5QVE one in that it uses a 6V6 beam power tube for the oscillator, and has provision for keying the oscillator cathode circuit. Also, a normally-open SPST relay is incorporated which enables the operator to control the oscillator by means of the mode switch on the Signal Shifter proper.

All of the power and control leads terminate on the seven-pin male chassis plug, as does the r-f output lead. The r-f lead from output coupling capacitor C5 to chassis plug pin 6 uses a short length of RG-8/U r-f cable.

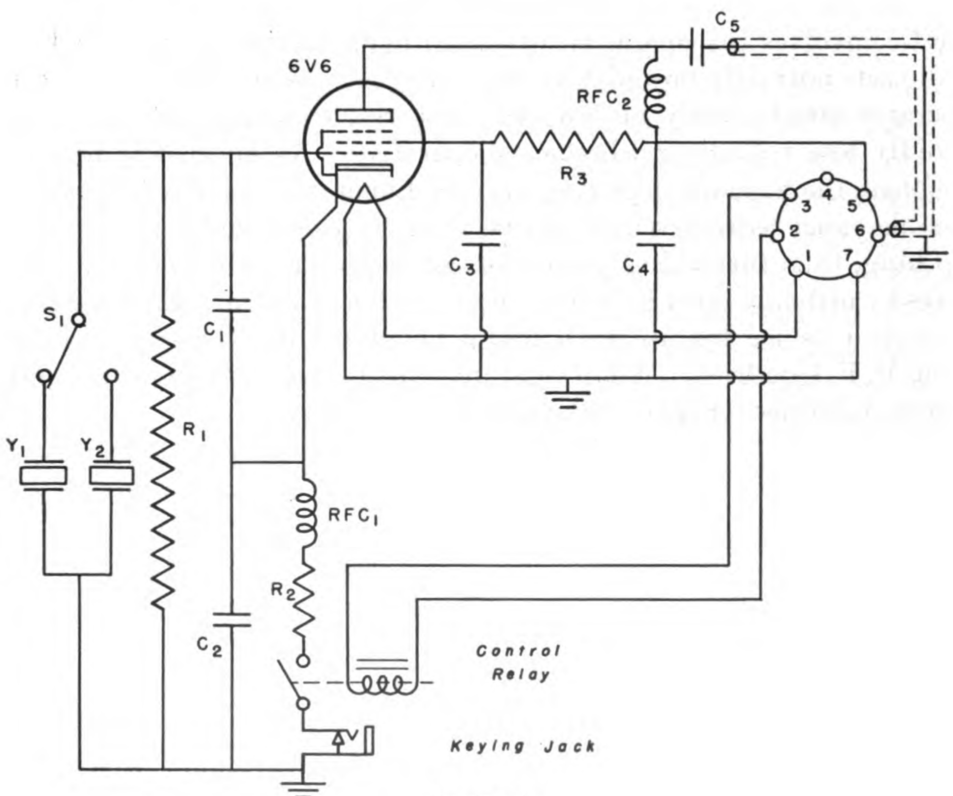


FIGURE 1.

The tuning range of the 6L6 output stage of the Signal Shifter is broad enough to provide output on any of the MARS frequencies in the 4000 kc to 4100 kc range using the regular 3500–4000 kc coil set without retuning the Signal Shifter. It is possible to change from variable-frequency to crystal controlled operation by means of the ECO-Xtal switch on the panel of the Signal Shifter.

This oscillator has been in use by A3NQA since September 1951 and has proven satisfactory in every detail.

Parts List

C1	Grid excitation capacitor	20 mmfd, mica.
C2	Feedback capacitor	150 mmfd, mica.
C3	Anode grid bypass capacitor	.002 mfd, paper.
C4	Plate bypass capacitor	.002 mfd, paper.
C5	R-f output coupling capacitor	100 mmfd, mica.
R1	Grid leak resistor	50,000 ohms.
R2	Cathode bias resistor	400 ohms.
R3	Anode grid voltage dropping resistor	100,000 ohms.
Rfc 1	Cathode load inductor	2.5 millihenrys.
Rfc 2	Plate load inductor	1 millihenry.
Ry 1	Control relay	SPST, normally open; 110 VAC solenoid.

VEST-TYPE BATTERY

A major difficulty in maintaining radio communications in the Arctic involves the operation of small, hand-carried or man-packed radio sets normally powered by dry batteries. While the radio itself operates satisfactorily at low temperatures, standard dry batteries rapidly lose voltage and become inoperative. As an answer to this problem, the Signal Corps Engineering Laboratories have designed a flexible cased battery which can be worn as a vest under arctic-type clothing, thus furnishing protection against extremely low temperatures by utilizing body heat to keep the batteries warm. First models of such a device for use with Radio Set AN/PRC–6 were obtained from B. F. Goodrich. Additional investigation of case materials and specific batteries for other radio sets is now proposed.

A MULTI-BAND MOBILE ANTENNA

By A1JOT

This is the story of how A1JOT went mobile.

After much reading and planning it was decided to purchase a commercial rig. With procurement of a Harvey Wells TBS–50C came a few installation problems, the most important of which was the selection of a proper mobile antenna. It was decided to operate the rig on 10 and 20 meters as well as 3940 and 4080 kc. A radio catalog revealed an interesting description of a multi-band mobile antenna of high efficiency with replaceable coils for the different bands called the Master Mobile. However, unnecessary work would be entailed when rapidly QSYing from band to band. The antenna was purchased in spite of its limitations and the coil cut for 3940 kc. Operations seemed to bring good reports on that frequency.

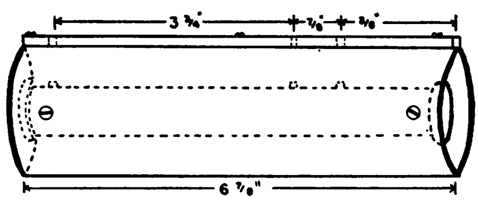


FIGURE 1.

Something had to be done about operating on the other bands without becoming involved in disassembling the antenna each time the bands were changed. With this in mind a visit to W1WK, Leon G. S. Wood, of Wollaston, Mass., was made. Woody has a good reputation for being able to put out a good mobile signal; it was known that he used some sort of special antenna. W1WK was using a Master Mobile antenna with an 80-meter coil for operation on 10, 20, and 75 meters. This antenna had been modified by tapping the coil and using a shorting screw to change bands. The results obtained proved that it was an efficient radiator. The necessary instructions were received for adding the frequency 4080 kc, together with pertinent construction details and testing procedures. Now began the construction phase.

The *first step* was to remove the antenna from the vehicle, disassemble, and remove all the wire from the coil form. (This coil in its original form had a resonant frequency of 3600 kc. By removing 23 turns from the bottom end, it then resonated at 3940. This left the coil with 116 turns close wound covering a winding distance of $3\frac{3}{16}''$.)

Second step—A piece of brass, approximately $\frac{1}{8}''$ thick, $\frac{5}{16}''$ wide and $6\frac{1}{2}''$ long, was bolted vertically on the side of the aluminum coil

shield. This was secured at the extreme ends and in the center by three 6/32 machine screws, lock washers, and nuts. Necessary holes were drilled for the 10 and 20 meter and 4080 kc frequencies. These holes were tapped for 6/32 machine screws.

Third step—The antenna was reassembled and a long 6/32 screw with a pointed end was inserted in each of the tapped holes until it touched the coil form hard enough to mark it. The antenna was again disassembled.

Fourth step—The contacts for the 10, 20, and 4080 taps were made of three brass wood screws with approximately 3/16 heads. The shank of the screw was cut off so that approximately 3/16″ remained. Holes were drilled in the coil form of sufficient size to necessitate forcing the screws into the holes. The heads of these screws were made ready for soldering.

Fifth step—Number 20 solid enameled wire was used for the coil. One end of a spool of this wire was fastened to the bottom machine screw on the coil form. The wire was soldered to the 10-meter contact. The 20-meter coil was then wound and as the wire passed over the 20-meter contact, it was again soldered. The winding was continued, repeating the process at the 4080 kc tap, and the coil terminated at the top brass machine screw of the coil form. The antenna then was reassembled and mounted on the vehicle and a piece of RG 8U (52 ohm) coax 6 feet long connected for the transmission line. (This was long enough to reach the transmitter which was mounted in the trunk.) This completed the construction phase.

The *sixth step*, and the most difficult, began with a check of the 20 meter coil. The equipment at hand was a grid dipper and an antennascope (see Sep 50 CQ). These two instruments are a must when you desire to get the maximum efficiency out of your antenna. Considerable difficulty was experienced in getting the 20 meter coil to resonate properly due to the large tuning capacity used in the dipper, however, satisfactory adjustment was eventually made. Considerable removing and spacing of turns was required before the job was completed. Adjustment was made on the 4080 and 3940 taps in a similar manner. A brass 6/32 x 1¼″ machine screw with wing locking nut was used as the shorting screw.

Seventh step—Receiving checks were made with each tap. The results with a Gonset Tri-Band converter were far superior to that of an 8-foot whip antenna. Subsequent transmitting checks on 3940 and 4080 indicate the antenna radiates the RF in fine style. The other bands also load well.

Construction Hints

1. Turns on the coil must be kept close together.
2. Contacts should be only as large as necessary.

3. Put a ball of solder on the contacts and on the machine screw used for shorting purposes.
4. Make sure all connections are well soldered and holes for machine screw contacts are kept clean.
5. Use a wing nut for locking the shorting screw.
6. Insert short screws in the tapped holes so that the weather and dirt will not give you poor contacts between the brass strip and the shorting screw.
7. With dirt and rain to be considered, it is best to keep the coil contacts facing in the direction of the rear of the vehicle.
8. To improve the contact between the coil shield and the top section of the antenna, tie the brass ferrule on the top end of the coil, substitute a brass tinned washer for the rubber washer, replace the coil shield and put rubber washer next to coil shield with metal washer between rubber and base of top section.

Adjustment Hints

1. The Master Mobile antenna is a high "Q" antenna, so be sure you do nothing to reduce the "Q." Inserting the shorting screw apparently does not change the "Q," however, actual measurements were not made.
2. Removal of turns and spacing is most critical at the top of the coil. When final adjustments are being made extreme care should be used in spacing turns for a considerable change in frequency results from only slight alterations in turns and spacing. One turn removed from the bottom raised the frequency approximately 15 kc.
3. Use a grid dipper, antennascope, and an accurate frequency measuring device for best results. These antennas tune quite sharp. Adjustment while using this equipment was made with comparatively little difficulty.
4. Be sure the antenna is as clear of surrounding objects as possible when tuning adjustments are being made.

Conclusion

This is a highly efficient antenna, very easy to change bands, and relatively simple to construct. The work involved is more than compensated for by its operation. Further modification can be made for MARS work by eliminating the 20 meter tap and installing a 4020 kc tap instead.

A PRE-AMP UNIT FOR 10 METERS

By Roy R. Trahan (A5OMH)

This article describes a 10-meter preamplifier unit. It is a two-stage affair employing three tuned radiofrequency circuits with a 6SG7 remote cut-off pentode for the first r-f stage and a video-type 6AG7 power pentode for the second r-f stage. The whole assembly, together with power supply, is mounted on a steel 7½ x 9 x 1½ chassis and installed in an appropriate cabinet.

As shown in the diagram, the preamplifier is tuned by three tandem-ganged 50 mmfd variable capacitors, with C1 across the secondary of the input transformer, C2 across the primary of the interstage transformer, and C3 across the primary of the output transformer. These capacitors are individual units, each having an extension shaft at the rear end for convenience in coupling to the following capacitor.

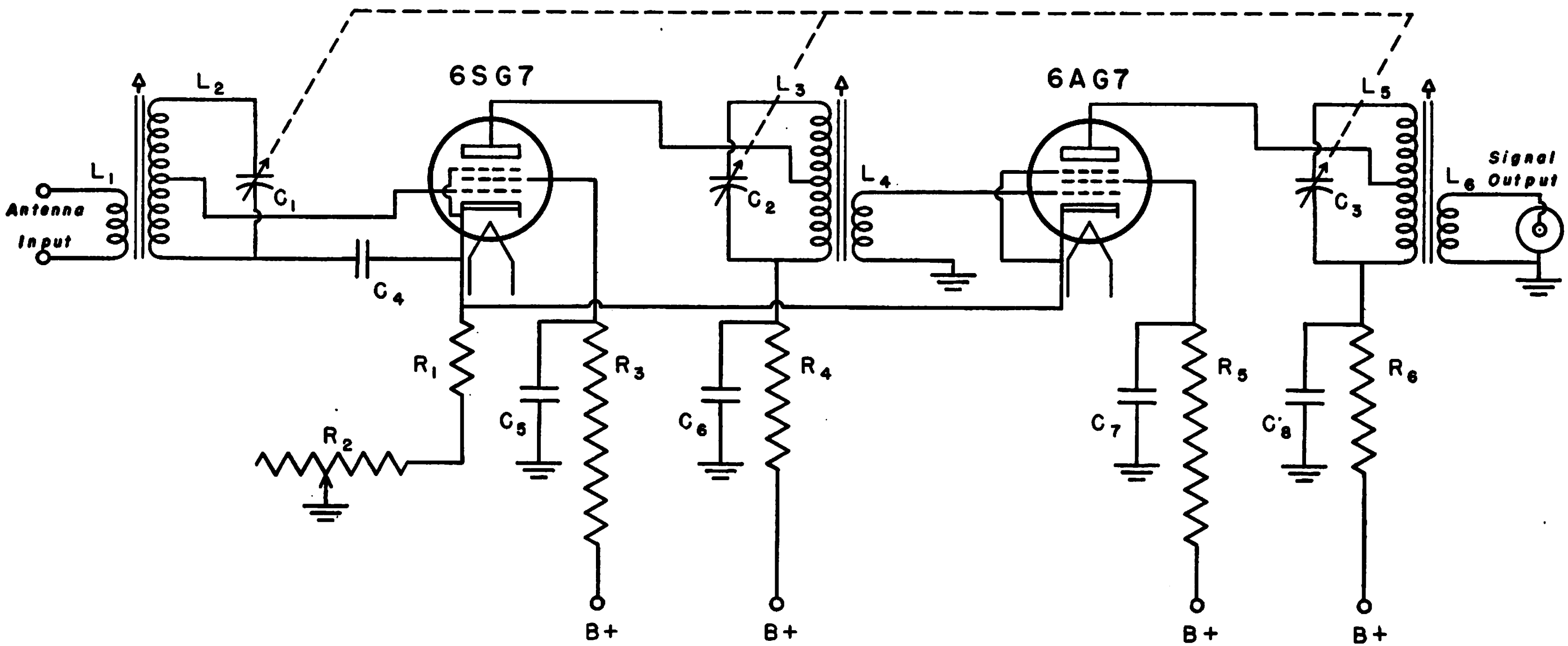
The three radiofrequency transformers, L1–L2, L3–L4, and L5–L6, are hand-wound of No. 18 AWG enameled wire on type XR–50 mica-filled coil forms fitted with permeability tuning cores. The primary of the input transformer L1, and the secondaries of the interstage and output transformers, L4 and L6, are each wound on the "cold" end of their respective units.

R-f sensitivity control is accomplished by means of the rheostat R2 in the common cathode circuit. Resistor R1 serves to limit the minimum resistance of this circuit. While it is not shown in the schematic diagram, the A5OMH model has the power on-off switch ganged with the sensitivity control.

TUNEUP INSTRUCTIONS:

Set tuning condenser one-quarter of the way in mesh or a little less, with a good signal coming through, then peak the XR–50 coils to give the loudest signal. You will find that when a signal is picked up on the receiver with the pre-amp in the circuit the signal strength can be increased by tuning the pre-amp with the variable condenser. From the antenna relay to the pre-amp 300-ohm ribbon should be used. From the pre-amp to the receiver 52-ohm coax should be used.

This pre-amp has been in constant use at A5OMH since 1949.



6SG7
6AG7
L1
L2
L3
L4
L5
L6
C1
C2
C3
C4
C5
C6
C7
C8
R1
R2
R3
R4
R5
R6
Antenna Input
Signal Output
B+
B+
B+
B+

FIGURE 1.

PARTS LIST FOR THE PREAMPLIFIER UNIT:

C1	Input tuning capacitor	50 mmfd variable.
C2	Interstage tuning capacitor	
C3	Output tuning capacitor	
C4	1st r-f screen bypass	.01 mfd, 400 volts.
C5	1st r-f plate bypass	
C7	2d r-f screen bypass	
C8	2d r-f plate bypass	
C6	Blocking capacitor	.1 mfd, 400 volts.
R1	Limiting resistor	200 ohms, 1 watt.
R2	Sensitivity control	10,000 ohms, wirewound.
R3	1st r-f screen dropping	50,000 ohms, 1 watt.
R5	2d r-f screen dropping	
R4	1st r-f plate decoupling	5,000 ohms, 1 watt.
R6	2d r-f plate decoupling	
L1	Input transformer primary	3 turns No. 18 AWG enameled.
L4	Interstage transformer secondary	
L6	Output transformer secondary	
L2	Input transformer secondary	8 turns No. 18 AWG, enameled; center tapped.
L3	Interstage transformer primary	
L5	Output transformer primary	

EIELSON AIR FORCE BASE

Men of the 58th Strategic Reconnaissance Squadron, Eielson Air Force Base, Alaska, have access to Mars Station AK1AG.

Captain Dean Mohr, Director, and Philco Engineer Andrew Robson have worked to overcome some of the bugaboos of Arctic transmission. AK1AG has a power output of 500 watts.

Captain Mohr obtained an amateur license in 1947. He was a civilian living at Detroit, Michigan; his call letters were W8BEQ. After his recall to Air Force Duty in 1948, Mohr operated from Keesler Air Force Base in Mississippi with call letters W4RDF. He is now on the air (KL7AGN) from his quarters in Alaska.

SIGNAL CORPS EXTENSION COURSES OFFER FREE MILITARY AND TECHNICAL TRAINING

Signal Corps extension courses which provide free, streamlined instruction by mail in technical, tactical, and administrative Signal Corps subjects, offer MARS operators who are members of any component of the AUS a double-barreled opportunity for self improvement.

All military personnel benefit from taking the courses. MARS members can derive, in addition, specific technical information in the fields of radio and electronics. Included among the more than 100 courses offered are courses dealing with radio fundamentals, electrical fundamentals—AC and DC, antenna systems, theory and application of electron tubes, power supplies and regulation, television, and numerous others.

Extension courses are clearly written home-study programs designed to channel the student's efforts and enable him to absorb pertinent information in the shortest possible time. Their purpose is to help military personnel to expand their knowledge, increase their efficiency, and improve their chances for promotion through systematic spare-time study. The courses are mailed directly to the student wherever he may be. All study materials are furnished free of charge, including self-addressed, postage-free mailing envelopes.

Whether you are commissioned or enlisted—regular, reserve or National Guard—extension course study will give you accurate, current knowledge useful in your present duties, helpful in gaining promotion to a better assignment, and completion credits that add luster to your military record.

If you are enlisted, and seeking a promotion, the records show that one of the best ways to be sure of answering the questions of the promotion board correctly is to complete the 10 series of extension courses.

If you want a commission, successful completion of the 10 series courses will, in most cases, satisfy the minimum military educational requirements.

If you are a reservist, you need credit points for retirement and to retain active reserve standing. Reservists earn one retirement point for every three credit hours of extension course work satisfactorily completed.

Enrollment is easily accomplished. Ask your unit commander, or unit instructor, for four copies of DA Form 145 (Application for Enrollment), fill them in and return them to your commanding officer for forwarding, by indorsement, to Director, Department of Nonresident Instruction, Fort Monmouth, N. J., for appropriate action. Indicate on your application that you are a MARS member.

MILITARY AMATEURS IN AUSTRALIA

The following information on military amateur radio in Australia has been furnished the MARS BULLETIN *for publication from the Australian Military Mission in Washington, D. C.*

"Since the end of World War II, approval has been granted for certain units of the Australian Military Forces to form radio clubs and operate experimental radio stations as an impetus for training. In addition, personnel in possession of a current amateur operator's certificate of proficiency may be given permission to operate their own amateur stations on Army property.

"At the present time membership of unit radio clubs is restricted to active members of the unit, i. e. serving Regulars or members of the CMF, whilst the aims of such clubs are confined to the stimulation of interest in radio among unit members and to act as a training medium. For this reason AHQ approval has been given, in certain cases, for radio clubs to use Service pattern wireless equipment.

"To insure that the Security aspect of these activities is safeguarded it is necessary for operators to adhere to the following instructions:

a. When and where a current Service set is being used no mention will be made of this fact nor the type of set nor any associated equipment, nor its role in the service nor its technical design. Such a set may be described only in the broadest outline, 'A six valve, master oscillator transmitter.' The wattage and aerial type may be stated.

b. Irrespective of whether Service pattern equipment is in use or not, no mention will be made on the air or on QSL cards of any matters pertaining to the Army or the name or location of any unit other than a permanent fixed establishment.

c. No mention will be made of the rank of any operator or any member of the club.

"In all cases the provisions of the Wireless Telegraphy act, 1905–1950 and the Regulations made thereunder, must be rigidly observed. The use of equipment capable of delivering power much in excess of 100 watts has been reported in some instances; in this regard the use of Wireless Sets Number 133 and 153 are contrary to the Regulations because, with either set, an output of 300 watts is possible although the set will be normally operated when switched to low power..

"Recent reports from Commands indicate a desire on the part of local radio clubs to conduct scheduled 'hook-ups' with other clubs and, as there is no obvious reason why this should not be arranged, inter-club action should be initiated to build up an organization similar to the American MARS (Military Affiliate Radio System).

"Since MARS was formed in November 1948, nearly 10,000 amateurs have joined its ranks. To be eligible amateurs were required to have

some military affiliation, either as active members of one of the U. S. Services, or as a member of a Service Reserve, or National Guard (equivalent of the CMF).

"However, this restriction was lifted in November 1950, and now selected civilian amateurs are allowed to participate in the network as part of the National Defense System. The purpose of MARS is—

(a) To create interest and further training in military communications.

(b) To coordinate practices and procedures of amateur radio operations with those of military communications and

(c) To provide an additional source of trained radio communications personnel in the event of local or National emergency.

"The basis of the organization of MARS is that it will follow those channels of command currently prescribed for components of the U. S. Army. It is organized to provide a complete radio network, throughout the continental limits of the United States, which can be made readily available to military commanders, Red Cross representatives or other authorities who may be charged with emergency responsibilities in a given area. To make this possible, operating frequencies, outside the amateur bands, are allotted by the Army and Air Force.

"The establishment of such a system within the AMF would no doubt attract recruits to CMF Signal units from among the amateur ranks and it is already known that the Wireless Institute of Australia is interested in the matter."

THE MOBILE TELEVISION UNIT ON LOCATION.

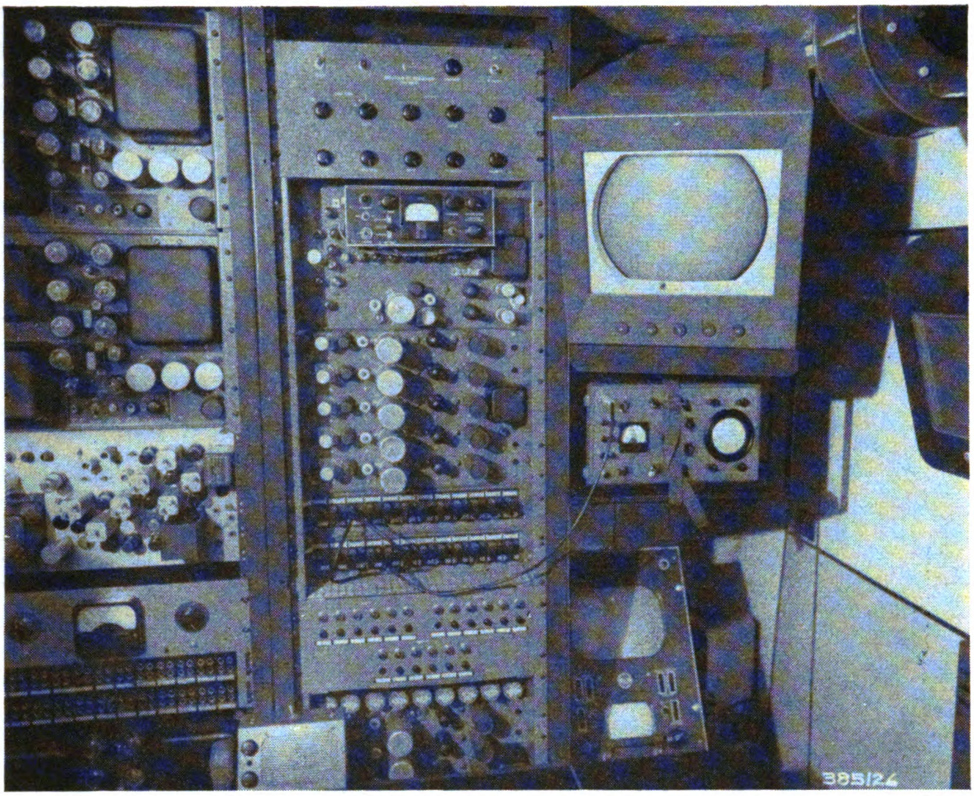
SIGNAL CORPS MOBILE TV SYSTEM

Of interest to MARS members is the recently developed mechanized television system planned at the Signal Corps Engineering Laboratories, contracted for and delivered by RCA and currently being demonstrated throughout the Army.

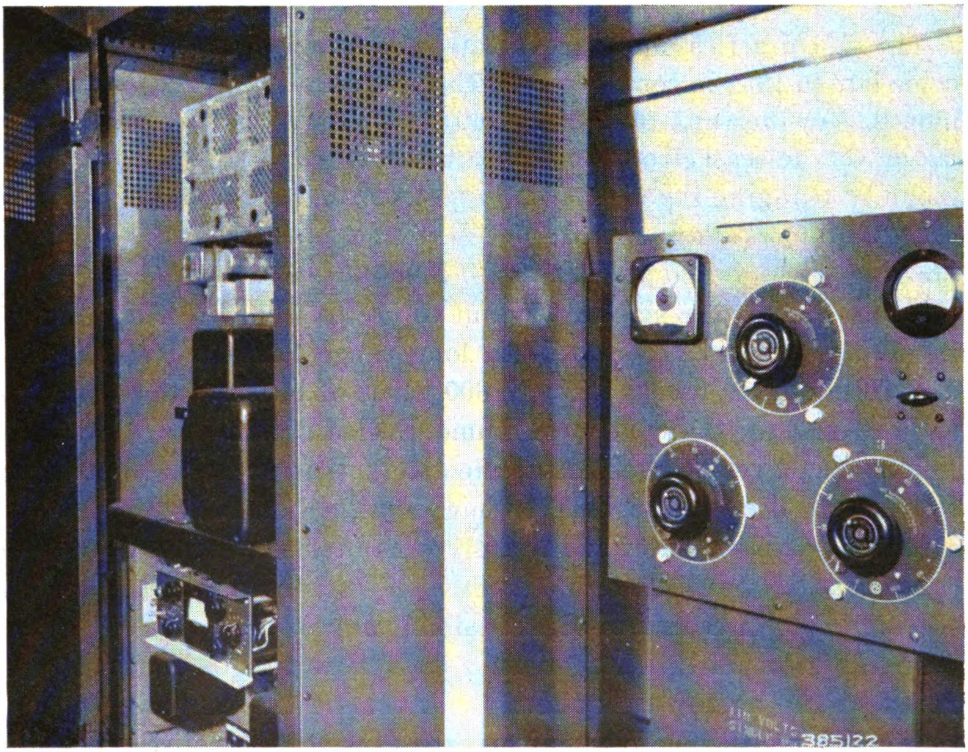
The system consists, basically, of four buses, housing cameras and transmitting equipment, a receiving unit, and two power units.

In addition to housing the units the four buses furnish organic transportation. Unit 1 contains transmitting equipment and three cameras which are controlled by two officer-directors. Unit 2 always accompanies the first and provides the power needed by means of two 15 kw gasoline motor generators. Unit 3 has the receiver unit which feeds out the show by coaxial cable to any of ten 16-inch screens or to one life-size 6 x 8 foot screen. Motion picture film can be integrated from this van and projected on the screens. Unit 4 serves as power unit for Unit 3.

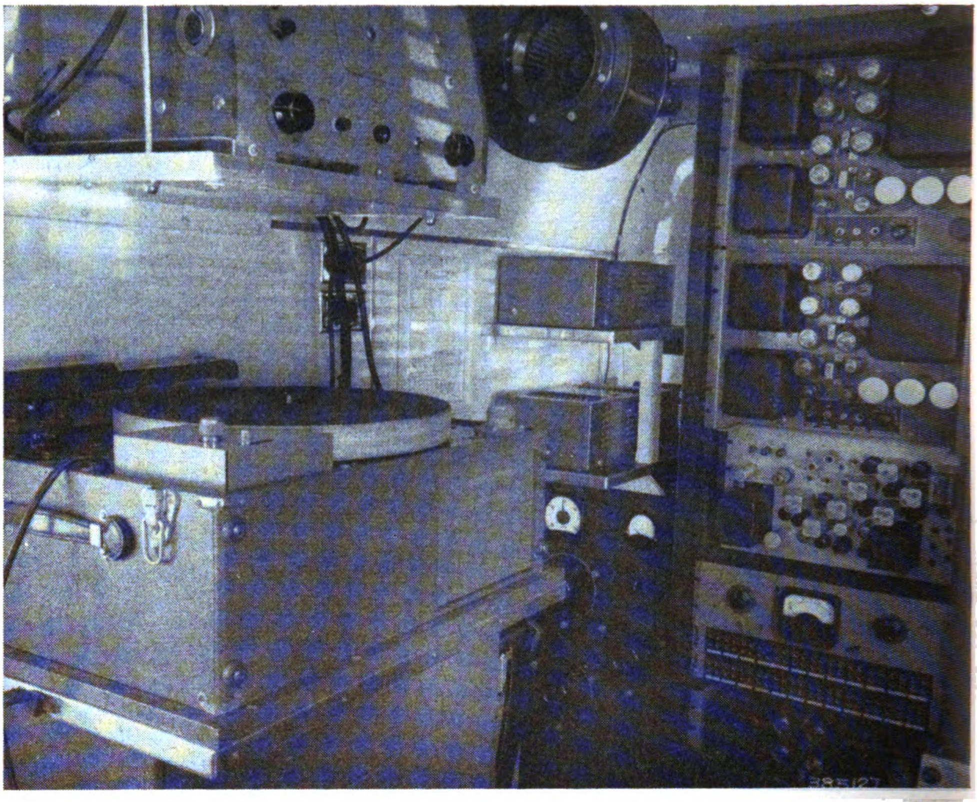
The mission of the Television System is to stimulate interest and thinking as to the tactical application of television, and to experiment with its application to military training programs. It is also to be used to promote public information activities by telecasting on-the-spot news events of military interest.



THE RECORD PLAYBACK ON THE RECEIVING AND DISTRIBUTION PANEL IN THE REAR OF UNIT No. 3.



THE TRANSMITTING PANEL FOR FM AND MICROWAVE TRANSMITTERS. ON THE RIGHT IS THE LINE VOLTAGE REGULATOR.



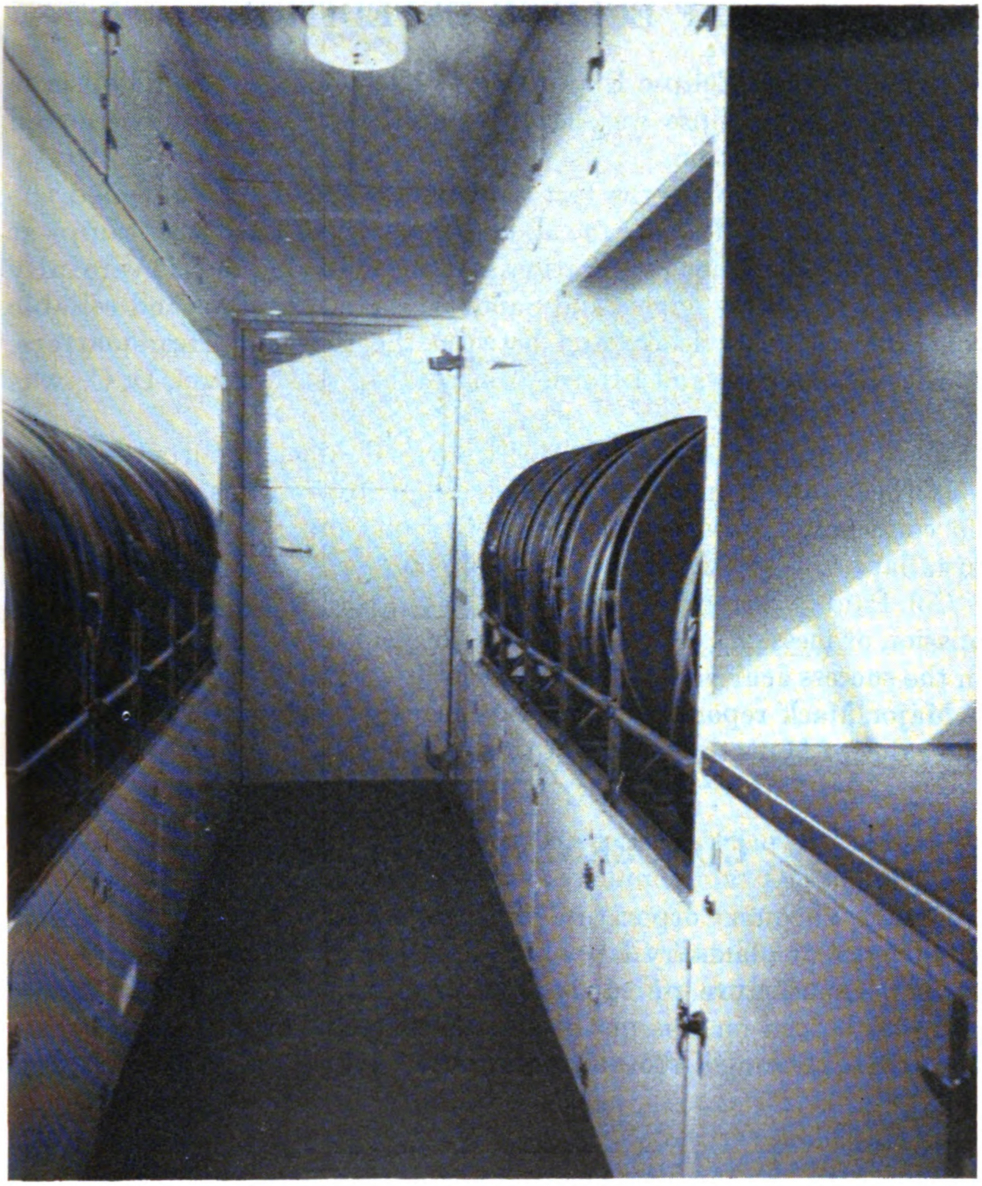
THE RECORD CUTTER AND PLAYBACK DISTRIBUTION PANEL INSTALLED IN THE REAR OF UNIT NO. 3.

The first practical application of the system to a training program came late in 1951 in conjunction with the Officers School at Fort Monmouth, New Jersey. A 1-hour course of instruction in fixed station radio was telecast from one building to another. The advantages included bringing the television picture of the control dials almost to the individuals' desks, affording clear and unobstructed vision impossible in a crowded auditorium.

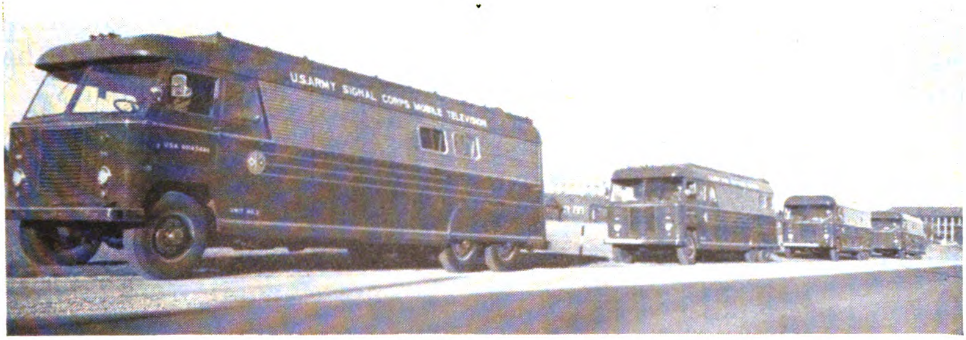
Early in 1952 the system was put to use to follow a field problem involving infantry troops. With long range lenses, television cameras followed the troops through 600 yards of brush to the objectives and screened the show in Fort Monmouth classrooms.

This maneuver demonstrated, effectively, that point-to-point transmission, although desirable, is not always possible. The mobile system has experimented successfully with the use of microwave relay equipment to go around mountains and other interfering terrain features that make line-of-sight beaming impossible.

In the experimental stages, field tests were run to determine the range of the microwave system, to determine the range of the FM radio carrying the audio signal, and the range of the police-type radio used for intercommunication.



THE WIRE CABLE STORAGE COMPARTMENT IN THE REAR OF UNIT NO. 4.



THE ARMY SIGNAL CORPS TV UNIT HITS THE ROAD.

USAF ECLIPSE EXPEDITION

The Air Force Eclipse Expedition to Khartoum, Sudan, to observe the 1952 lunar eclipse was heavily publicized and widely reported throughout the nation.

Not so well known is the fact that a MARS station accompanied the expedition. In addition to MARS facilities at the base camp at Khartoum, five other observation stations were located at carefully selected sites across Africa and Saudi Arabia. Constant and reliable communication service to and between the sites and Headquarters, Aeronautical Chart and Information Service, Washington, D. C., was essential.

The Chief, MARS Air Force, Maj. Charles C. Mack, reports that communication by commercial means offered great problems. There were no commercial services between Khartoum and the nearest USAF installation, Wheelus Airfield, Tripoli.

Col. Paul C. Schauer, USAF, Expedition Leader stated that "Transmission of messages through the MARS system was a substantial factor in the success achieved by the USAF Eclipse Expedition, 1952."

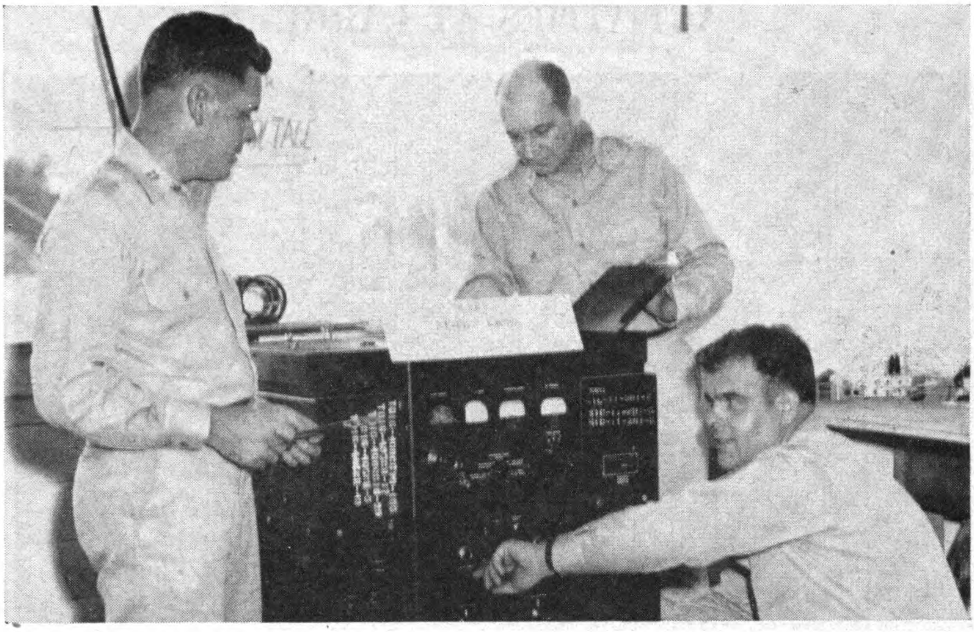
Major Mack reports that the experience of this expedition proves the value of MARS to projects of this kind.

CONCERNING CRYSTALS

Cranke Vacuum Corporation of Chicago, Illinois, is manufacturing a new type of planetary lap which apparently can be applied easily to the manufacture of fairly thin and very flat quartz crystals. Samples lapped on this machine have been submitted to the Signal Corps Engineering Laboratories for test.

UNITED NATIONS DAY—1952

On United Nations Day, 24 October 1952, MARS Headquarters Stations WAR and AIR transmitted a message from the Commander-in-Chief, U. S. Armed Forces—President Harry S. Truman. The message was addressed to all MARS members and was extracted from the President's remarks at the U. N. Day observance in Washington.



Capt. Frank F. Long, Maj. Joe R. Patton and Master Sergeant Lawrence R. George inspect the BC–610 transmitter at AF4FBA.

TURNER AIR FORCE BASE, GA.

The MARS Station at Turner Air Force Base, Georgia, was established by Maj. Joe R. Patton, 31st Communications Officer, upon return of the 31st Wing from England.

Equipment was procured from the 2d Air Force and Master Sergeant Lawrence George placed on special duty with the 31st Headquarters to serve as NCOIC of the station.

During the summer months Sergeant George conducts a course for amateur radio operators.

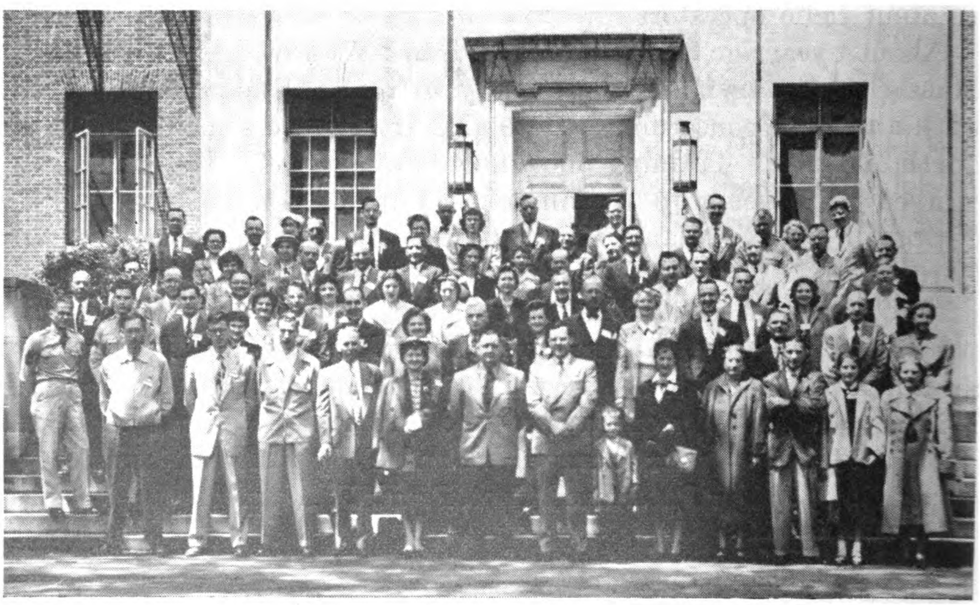
About 1 year ago Sergeant George heard Westover Air Force Base, Massachusetts, trying unsuccessfully to reach Headquarters USAF with a message concerning a B–29 aircraft downed somewhere in the north Atlantic. Training and know-how paid off. He cut in and relayed the message to Washington. Further relay was effected to Pepperell, Newfoundland; Kindley, Bermuda; and Lagens, Azores Air Force Bases. The site of the crash was located in a short time.

The Turner MARS Club consists of two groups—Men who do not hold amateur licenses, and men who know Morse code well enough to communicate at a rate of five words per minute. Meetings are held twice a week and demonstrations and instructions given by M/Sgt. George, M/Sgt. Walter Maurer, Jr., and T/Sgt. Allen Maxwell, Jr. Advisors are Major Patton and Capt. Frank F. Long.

ACTIVITIES AT LARGE

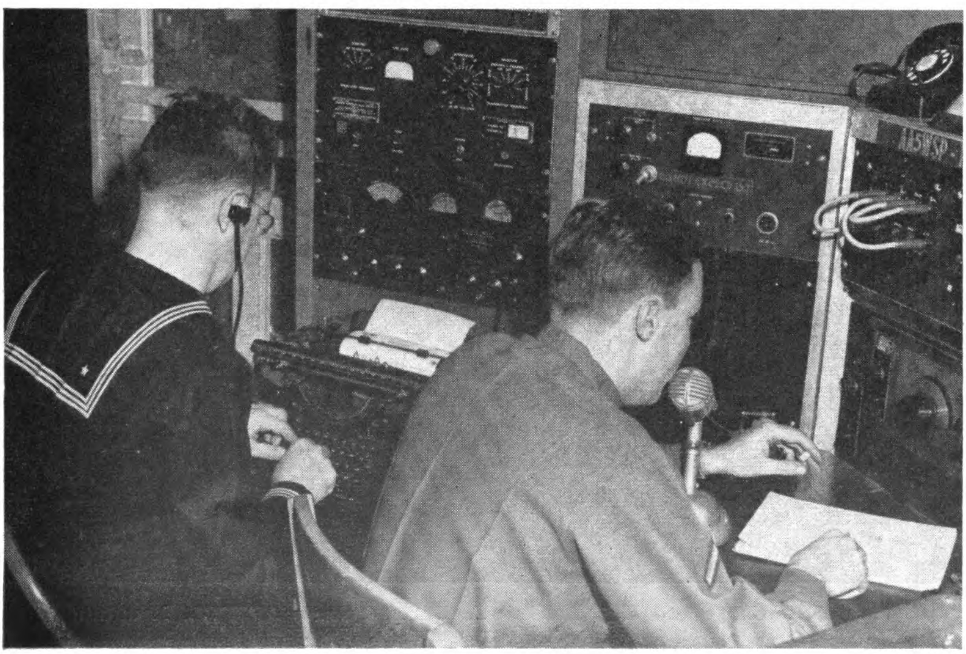
ABOVE: Members of the First Army MARS Advisory Committee photographed at a recent meeting in New York City.

BELOW: A turnout of MARS members for a State-wide conference on the campus of Pennsylvania State College to discuss Second Army policies and Pennsylvania MARS activities.



ABOVE: Nathaniel G. A. Dorfman demonstrates his CODETYPER at a Third Army MARS-fest, Winston-Salem, North Carolina.

BELOW: ET–1 Austin C. Farrell (AF2BXE) and Pfc Lloyd A. Burrows (W6IMY) are shown operating equipment at AA5WSP.



A Japanese microphone is displaced with some of the QSL's collected at AA5WSP, White Sands Proving Ground, New Mexico.

Capt. Charles A. Koppe and Maj. Dominic A. Bartol operate AF7FBL, Mountain Home Air Force Base, Idaho.

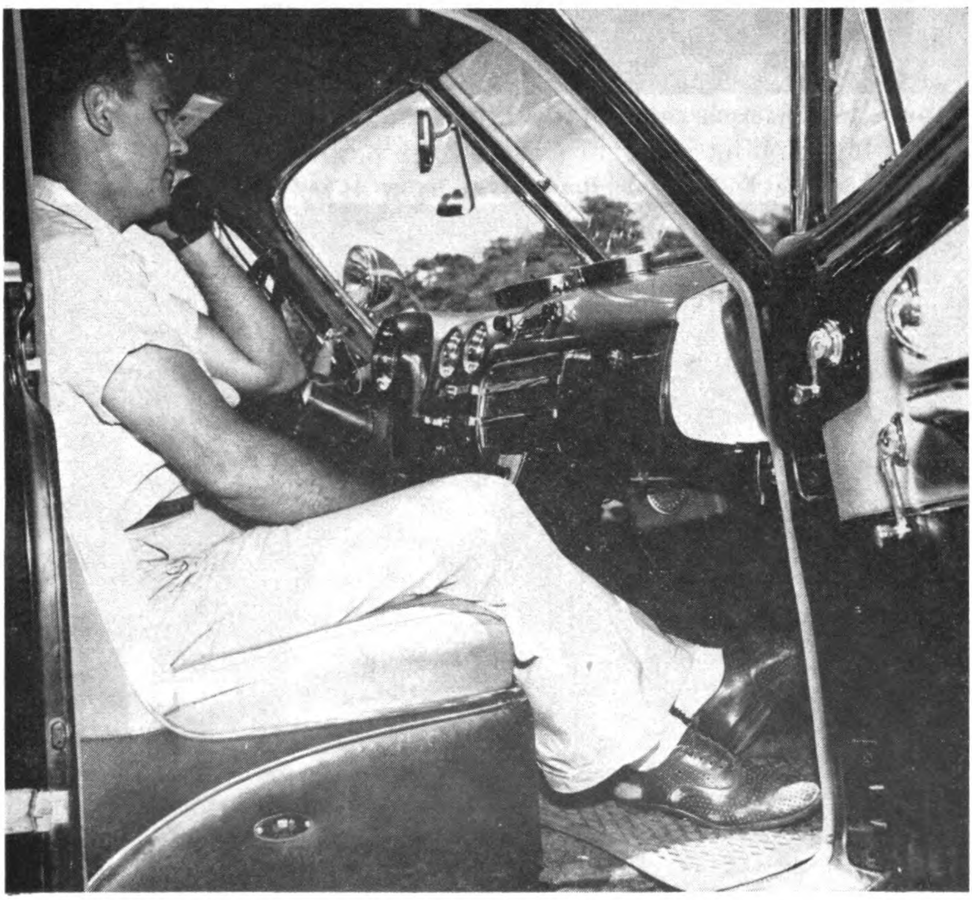
TESTING MARS IN PANAMA

The Panama Area Military Affiliate Radio System was put to a test in May 1952 as it took part in "Operation Jackpot," a unified effort of the Armed Forces to determine the effectiveness and readiness of the military personnel, their dependents, and civilian workers to handle "disaster" situations in the Panama area.

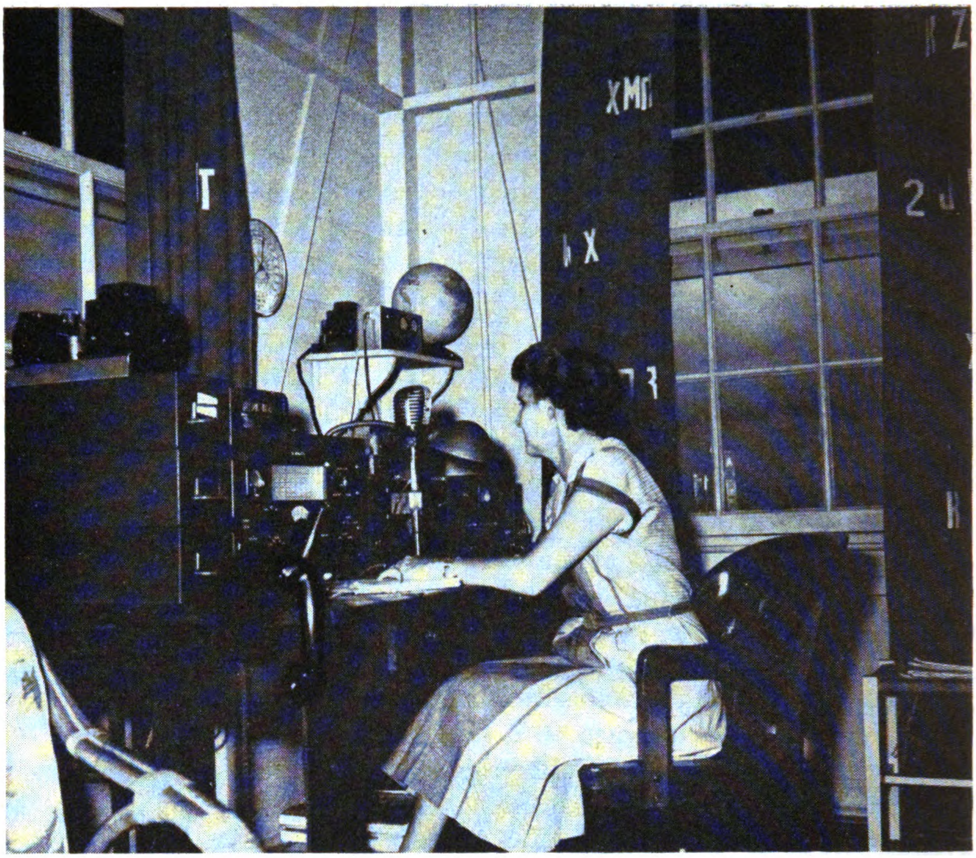
At 0820 local time on 8 May, an alert was sounded across the Isthmus. At 0830 a theoretical "A" bomb was exploded in one of the locks of the Panama Canal. Immediately upon receipt of an "all clear," AC5SM operated by Maj. H. J. Parry (AC5JQ), MARS Director Caribbean, called the emergency net into operation. Fourteen stations, including two mobile stations, were netted and ready for action in 15 minutes.

After the net was organized, AC5AA assumed net control and AC5CB replaced AC5JQ at the mike for AC5SM.

Members participating included AC5's AA, AZ, CB, DG, EE, FK, CG (mobile), JZ, ML, PC (mobile), SM, WB; AC6's AW, CN, WA; AC7LM; and AH6AA CN, DG, LM and ML are all YLs, active in daytime net operations.

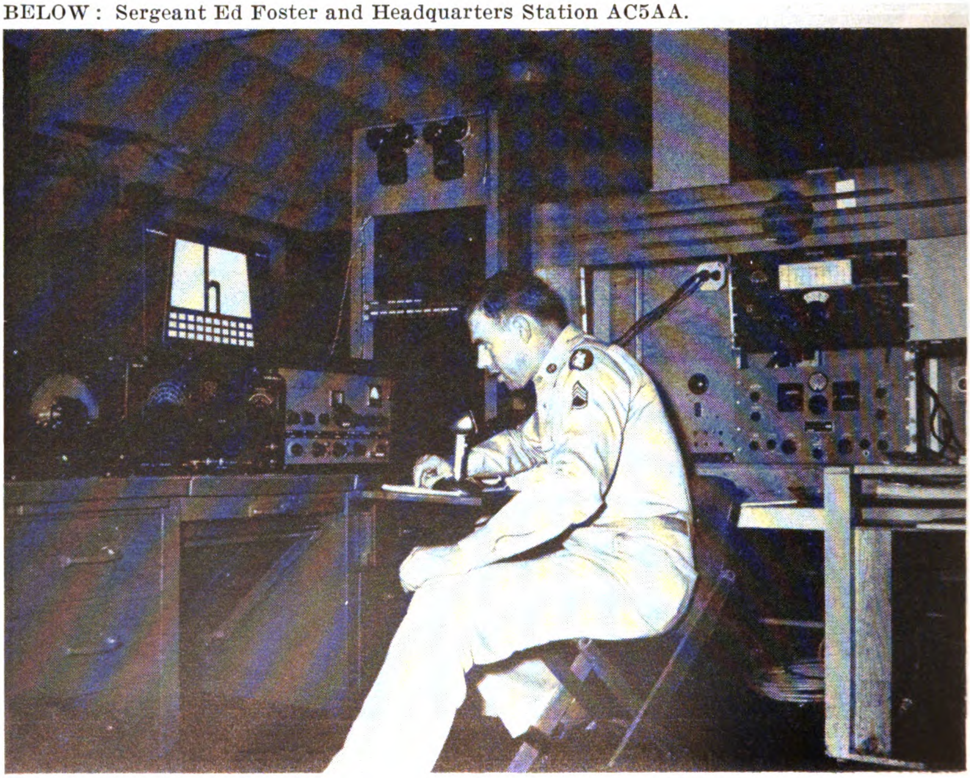


P. C. COMBS (AC5PC) AT THE CONTROLS OF HIS MOBILE RIG.



ABOVE: Mrs. Frank H. Lerchen (AC5ML) is a key operator in the Canal Zone MARS from her QTH at Diablo Heights.

BELOW: Sergeant Ed Foster and Headquarters Station AC5AA.



V. F. W. HONORS AF4PJU

Gratton George (AF4PJU) of Clewiston, Florida, has received the V. F. W. Good Citizenship Medal from Hawkins-Kirk-Gordon Post No. 4185, Veterans of Foreign Wars of the United States. The presentation was made by L. V. Bybee, former V. F. W. National Aide-de-Camp.

Gratton is an arthritis invalid. Four years ago he determined to engage in a useful hobby. With encouragement and assistance from his XYL, Irene, he struggled to master the International Morse code with his badly crippled hands.

Sometimes AF4PJU must use special devices—tubes with claw-like fixtures which fit on the knobs—to throw the switches and control the dials.

High on Gratton's list of personal accomplishments is the message he relayed from Portugal. A child was critically ill with spinal meningitis and a rare drug was needed to save her life.

Through contact with a New York City amateur W4PJU relayed the plea for help to a New York City newspaper. Within 6 hours after the call went out from Portugal the drug was on its way by commercial air line from the United States.

For his part in this Mr. George received a personal letter of thanks from Portuguese Ambassador Luis Esteves Fernandes.

Because he has almost unlimited time for operation, AF4PJU is a stalwart MARS member and a key station for the Southern States. He has received authority to operate not only with Air Force stations but also to participate in Third Army MARS nets.

A4KJ, Florida Army MARS control station, estimates that W4PJU/AF4PJU handles 1,200 messages per month.

OPERATION ABERDEEN

MARS Station AA3WAS at Aberdeen Proving Ground has passed the midpoint in phase two of Operation Aberdeen which is the operation of an active outlet for personal type messages during Preventive Maintenance School at Aberdeen Proving Ground, Maryland.

The first school was held 11 March 1952 through 13 June 1952 for senior officers, many of them Corps and Division commanders.

The second school is now underway. Complete returns are not available for the current course, but 140 messages were handled in the first school period for members attending the PM course. During this same period 540 messages were handled "off post."

Equipment available at AA3WAS and augmented as a special MARS Headquarters project included a BC 610 and a Viking I transmitter, and a Collins 75 A and an NC 100 receiver. A Meissner Signal Shifter was employed as VFO; a rotary beam antenna was installed.

MARS RADIOTELETYPEWRITER ACTIVITY

Considerable interest has been shown by MARS members in the development and operation of MARS radioteletypewriter equipment.

Details of net operation throughout the system are not yet available. However late reports from the East Coast region show the four-station net controlled by A4OLL, Jack Brown of Herndon, Virginia, has been conducting some experiments on the MARS frequency of 3497.5 kc. Working with A4OLL are A4FJ, Ted Mathewson of Richmond, Virginia; AA2WAO (opr. Steve) of Fort Dix, New Jersey; and A4SQF, Bud Sable of Alexandria, Virginia.

Communications between all stations of the net have ranged from excellent (solid copy) to poor (50 percent or less). In general, poor copy has been attributed to CW transmissions on, or close to the net frequency. Some poor copy is the result of bad propagation conditions. However, only a small percentage of "error" copy has been traced to this factor.

The net concerns itself primarily with working out standards for MARS teletypewriter operation, including feasible procedures and prosigns, and a determination of how many stations can work on a simplex basis on a fixed frequency. Compilation of the eventual results is expected to be of assistance when the amateur frequencies are available for radioteletypewriter operation.

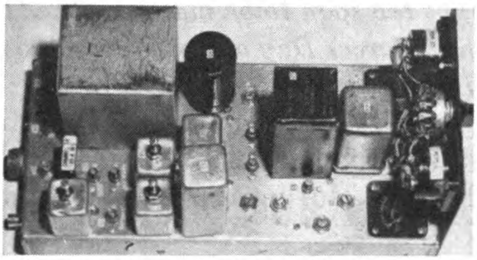
The net operates on Saturdays during the period 1800Z to 1900Z and 2000Z to 2100Z. A secondary period of operation from 2000Z to 2100Z on Sundays also has been established. All operations and use of net time was cleared through the Chief, MARS (Army).

MARS Headquarters is interested in learning how many MARS members have equipment for copying teletypewriter transmissions. In addition to the planning and establishment of nets, monitors are desired to furnish information on the strength, type of copy, distance versus fade effect and other valuable planning data.

Future plans include the transmission of the weekly MARS Broadcast by RATT from MARS Headquarters as well as by CW. Times and frequencies will be included in the weekly broadcast on CW when RATT transmissions begin.

If you have teletypewriter equipment, or plan the early procurement of RATT facilities for your station, please send complete information to MARS Headquarters through your regular command channels.

MILITARY USE OF TRANSISTORS



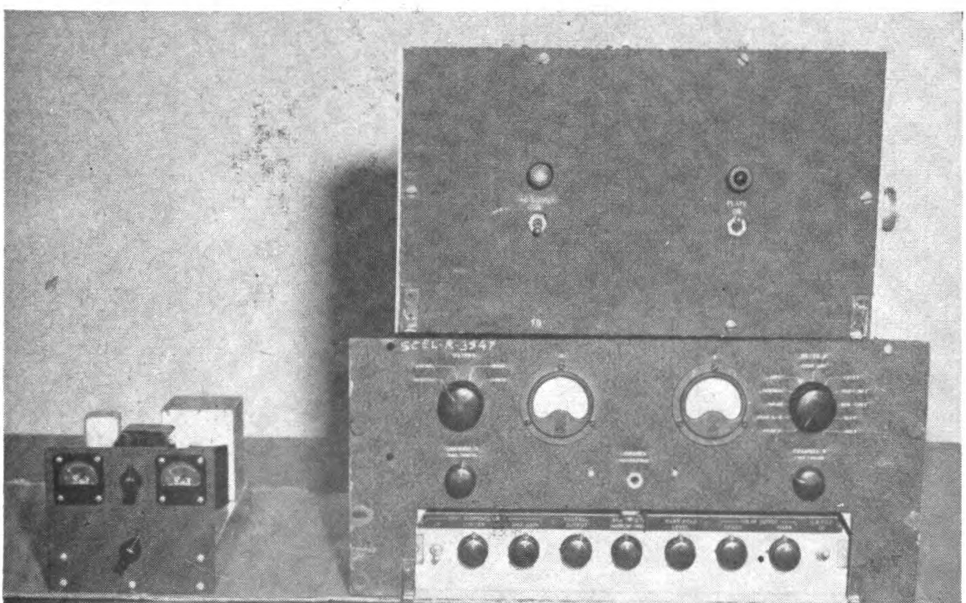
THE EXPERIMENTAL CONVERTER (TOP VIEW).

Transistors used by the Army Signal Corps are helping to develop better and lighter communications equipment. Replacing fragile and comparatively short lived vacuum tubes, the solid germanium crystal transistors withstand vibration and shock, have an estimated life of 7 years continuous use.

Used in an experimental converter with radio teletypewriter equipment, transistors cut the weight of the unit to 10 pounds instead of the usual 100 pounds. They permit operation on 1½ watts power supplied by dry batteries instead of 175 watts supplied by heavy motor generator.

Development of transistors and military adaptation of current development is conducted at the Signal Corps Engineering laboratories.

Pictured above is a top view of the experimental converter. While it will take two of the new equipments to do what the old one will do, the saving in weight still is about 10 times. Note comparison picture below.



A COMPARISON IN SIZE.

1952 ARMED FORCES DAY—HAWAII

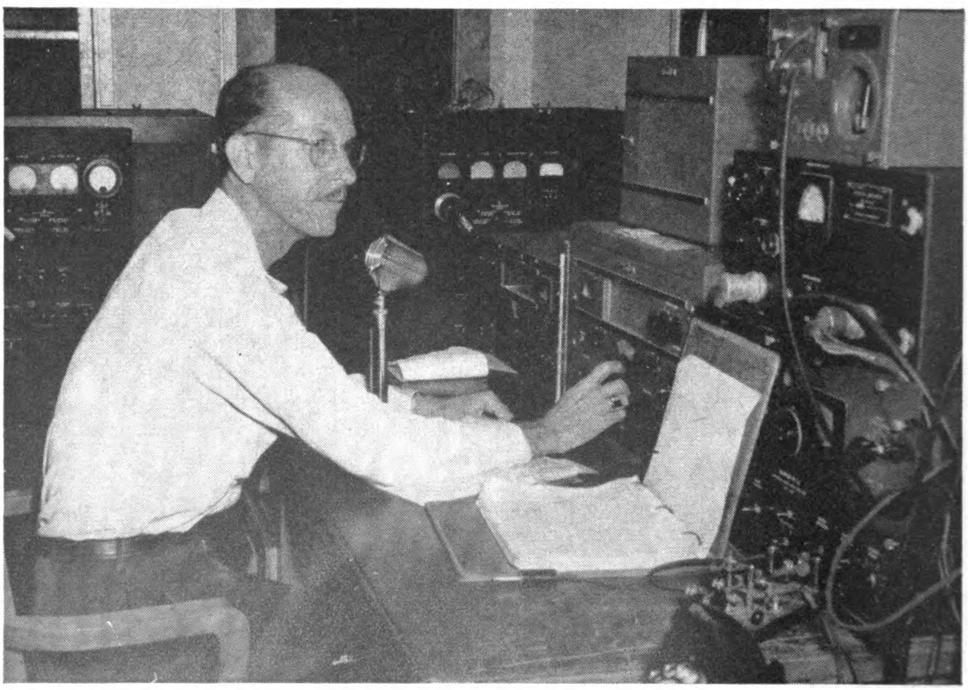
(*Ed. Note: It's not too soon to be making plans for your station to participate in Armed Forces Day activities for 1953. Can you match what the gang in Hawaii accomplished in '52?*)

Army and Air Force MARS members of Hawaii pooled their resources to establish a fully equipped MARS station at the 49th State Fair, Sand Island, T. H., during the week of Armed Forces Day—17 May 1952.

A two position station was installed to provide simultaneous two-band operation. One position utilized a BC–610, Collins 310–B Exciter, Collins 75 A–1 Receiver and a Hammarlund Super-Pro. The other position was an Air Force "package unit" featuring a 32V2 transmitter and a 75 A–2 Receiver. A 5-inch scope indicated modulation patterns for the spectators. A 75 meter doublet and a 10 over 20 Gordon Roto Beam antenna were installed. The beam was set on a 60-foot pole with large 30-inch bright red letters spelling out M A R S fastened to it. Floodlights made the beam an effective display during the evening hours.

A large map of the world, centered on Hawaii, was prepared to illustrate countries contacted by AB6USA. Colorful QSL cards were selected and used to identify countries on the map.

Four operators were on duty during Fair hours to handle traffic, answer questions and work regular MARS USARPAC drill nets.. Approximately 500 messages were cleared to stateside from the fairgrounds.



MEL VITTUM (AB6AO) AT THE USARPAC HEADQUARTERS STATION AB6USA.

U. S. GOVERNMENT PRINTING OFFICE: 1953

MARS AMATEUR EXTRAS

As previously announced the MARS BULLETIN is glad to publish the calls of MARS members who are licensed by the Federal Communications Commission as Amateur Extra Class Radio Operators. Names of MARS members who qualify for this list should be furnished to The MARS BULLETIN, Room BE 1000, The Pentagon, Washington, D. C. The following names were furnished as of 1 January 1953:

*Thomas Greenhalgh, W1QYY (AF1QYY)

*Dan Lindsay, W2PLD (trustee A2KYN)

*Clay Cool, W2EBZ (A2EBZ)

*Norman Hester, W9CSK (AF9CSK)

*Lawrence Rudolph, WØQHK, (AFØQHK)

*Joe Beler, W5PGF (AF5PGF)

*Ruel Edrington, W5PNM (AF5PNM)

*Donald Lyncy, KH6AML (AB6AML)

*Yutak Arakaki, KH6CH (AB6CH)

MARS BULLETIN

JULY 1953
Vol. 4 No. 2

Military Affiliate Radio System

PENTAGON BUILDING, WASHINGTON D. C.

ARMED FORCES DAY MESSAGE

16 MAY 1953

It is a pleasure for me as Secretary of Defense to extend Armed Forces Day greetings to the radio amateurs of America. Our theme for today is "POWER FOR PEACE" and the scientific hobby of amateur radio—which has made important contributions to many of the communication and electronic advances of our age—is symbolic of American power for peace. Radio amateurs overcome barriers of language and academic background. They conduct technical investigations for the advancement of the radio art and the ultimate betterment of mankind. The potential use of amateurs for both military and civilian defense is clearly demonstrated by the public service rendered local authorities and Red Cross officials in times of disaster and communication emergency. The Department of Defense wishes you continued success and will continue to cooperate with your endeavors.

(Signed) CHARLES E. WILSON

MARS BULLETIN

JULY 1953

VOLUME 4 NUMBER 2

***ABOUT THE COVER:** A MARS mobile radio station has been assigned to Headquarters Station WAR. The unit operates on all MARS (Army) frequencies and is capable of operating either high or low power in the 10, 15, 20, 40, 80 and 160 meter amateur bands. MARS Mobile Unit No. 1 was displayed for the first time on Armed Forces Day (16 May 1953) at Washington, D. C.*

CONTENTS

CQ . . . CQ . . . CQ . . .

The Military Affiliate Radio System is a joint Army-Air Force operation under the jurisdiction of the Chief Signal Officer, Department of the Army, and the Director of Communications, Department of the Air Force. These jurisdictions operate jointly for determination of policy but separately for operational control. The MARS BULLETIN is designed to provide information to all members; to throw open for discussion all problems of an operational, technical, or organizational nature; to provide a "mike" for each member; to provide a network or headquarters organization; and to keep all members informed of latest developments concerning MARS.

The BULLETIN will be distributed to all members who wish to receive it. It is prepared in the offices of the Chief Signal Officer of the Army and the Director of Communications of the Air Force.

Comments, suggestions, and constructive criticism are solicited from all members. Address correspondence to: The Editor, The MARS BULLETIN, Room BE–1000, The Pentagon, Washington 25, D. C.

EDITORIAL

Major ROBERT A. WOOD (USAF)[1]

It is believed that most of you will reap considerable personal satisfaction from the civil defense policy discussed elsewhere in this issue. MARS has felt a moral obligation to support civil defense in your community for a long time, but the task of establishing and publishing a military policy for such a situation is a long and tedious one.

Your MARS Advisory Committee, in an effort to expedite and clarify the position of the system, appointed a six-man working group to draw up a policy that the committee could submit to the Chief Signal Officer of the Army and the Director of Communications of the Air Force. Having accomplished this, the group would continue to "monitor" the program and assist in the preparation of future implementation guides.

The Chairman of this working committee was appointed from the Office of the Secretary of Defense. In this capacity he served as coordinator for the representatives of actual operating agencies and organizations. The successful accomplishments of the committee thus far are the result of untiring work by the committee members, who are:

Mr. F. C. Handy (AF1BDI), the American Radio Relay League
Mr. G. K. Rollins (W3GA), Federal Communications Commission
[2] Mr. C. P. Horne, Federal Civil Defense Administration
Major James A. Long (A3UWI), Chief, MARS (Army)
Captain Walter S. Browne, Jr., Chief, MARS (Air Force)

This editorial offers the committee an opportunity to make one thing quite clear to all MARS members. The one underlying thought behind this policy and future committee activities is that MARS will not enter into competition with any other communications service in its effort to support your civil defense. From the committee point of view the amateurs operating under the "RACES" program should be the primary source of communication outside the commercial and civil owned facilities. Where military communications support is required over and above these systems, MARS may prove to be of considerable value, both to the civil defense authorities and to the military commanders upon whom the request is made.

You will have to implement this policy. Therefore, here is a direct recommendation. If any of you have a suggestion to offer which may be of national interest, submit it to your MARS Director for relay to the committee. We cannot guarantee a reply, but we can promise to "work it over."

---

[1] Major Robert A. Wood represents the Office of the Secretary of Defense on the MARS Advisory Committee.

[2] (Mr. Horne has recently left the Federal Civil Defense Administration and has been replaced by Mr. Carl Jones.)

HOW TO QSY YOUR CRYSTALS

J. MICHAEL MURPHY (AF9PZM)

A new Viking recently was obtained at AF9PZM. The Viking performed well but crystals on hand offered some problems. One crystal was all right for MARS frequency operation but the others would not multiply to the MARS frequencies.

After searching through the HANDBOOK, Hints and Kinks, CQ, QST and an assortment of other books some information was collected and set down for study and use.

The list of materials suggested for a quality job of adjusting crystals was imposing. Needed were size 800 aluminum oxide, size 400 silicon carbide or number 303 emery and number 600 carborundum. None of these were available. Also recommended was the use of a micrometer to aid in keeping the contour of the crystal while grinding. Not being able to afford this item it was decided to "rough it" by substituting down the line on items needed to raise the frequency. The silvering process for lowering frequencies is considered best but the procedure is a little complicated. Here also it was decided to substitute.

These items are considered necessary or desirable for this work. AF9PZM has used items marked (*) : (Items in group 1 are necessary. Group 2 is a list of coarse abrasives, any one of which will do. Group 3 is a list of fine abrasives; again, only one is needed. Group 4 is a list of items used to lower frequency. Group 5 includes items not essential but which make the job easier.)

GROUP 1.

a. Test oscillator (preferably with a 0.5 ma. scale to check crystal activity at the beginning and as you progress. The one used by AF9PZM was made from the circuit shown in December 1951 MARS Bulletin, "Crystal Oscillator for Collins 32–V").

b. Two pieces of plate glass 10 or 12 inches square.

c. Three containers (tin cans from the kitchen will do nicely).

d. An old soft tooth brush.

e. A level teaspoonful of any detergent soap powder (4 drops of liquid detergent may be used instead). Dissolve in a quart of warm water and use as soapy water solution to clean crystals after grinding.

f. A small quantity of castile soap (to wash the crystal the second time before finally sealing holder).

g. A hand towel (for yourself).

h. Some clean lintless cloth and a few sheets of lens cleaning tissue.

i. Small quantity of shellac or varnish and small brush.

GROUP 2.

**a.* Valve grinding compound (any automotive store has this).

*b. A stock of jeweler's rouge (standard item stocked in Army-Navy and surplus stores).

c. Size 400 silicon carbide.

d. Number 303 emery powder.

GROUP 3.

*a. Kodak abrasive reducer (most photo stores carry this. Similar products of other manufacturers will also work).

*b. A small quantity of talcum powder (about 2 teaspoonsful will be plenty. Baby powder may prove too fine to work on crystals).

*c. A small quantity of tooth powder.

d. Size 800 aluminum oxide.

e. Number 600 carborundum.

GROUP 4.

*a. A small bottle of tincture of iodine (the one used by AF9PZM was labeled 85 percent alcohol).

*b. Mercurochrome (AF9PZM used a 2 percent aqueous solution; a more concentrated solution probably would give a more pronounced effect. The 2 percent solution proved fine for lowering that last kilocycle).

*c. Solder (a length of resin core was tried without appreciable success so a 6-inch piece of resin core solder was cut, coiled and placed on the cover of 1 of the tin cans which had been shaped like a saucer. This tin was laid over the soldering iron. The solder melted and the resin burned off. The liquid solder then was poured on another saucer-shaped piece of tin and placed above the iron with about one-half inch space between. This kept the solder warm but solid. Warm solder is easier to apply).

GROUP 5.

a. A micrometer (to check contour of crystal face and to insure even grinding).

b. A quick slip-on crystal holder (can be made from an FT–243 holder and a cover of aluminum, tin or sheet metal).

c. A button for holding crystal, made from a circular piece of glass or plastic, larger in diameter than width of crystal and slightly concave (to hold crystal against surface with grinding compound).

d. An eye dropper for adding water to grinding compound when necessary.

The two processes in adjusting crystals are raising the frequency and lowering the frequency.

If you are moving the crystal only 5 kilocycles or less, start with step 2 below and skip step 1. If you must change the frequency 10 or more kilocycles, start with step 1.

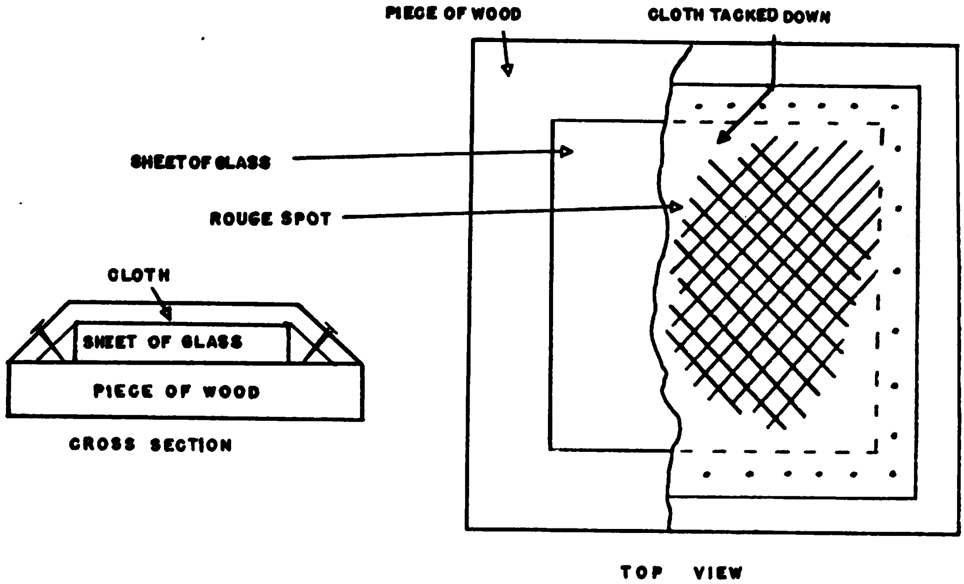


FIGURE 1.

Step 1.—Select a coarse abrasive and apply it to one sheet of glass. A patch 3 or 4 inches in diameter will be enough. If you select rouge, it will be necessary to place the glass on a slightly larger board or piece of wood. Tack a folded piece of cloth over the glass to make a pad (see fig. 1) then rub the stick of rouge on the cloth. When the patch is red you have enough. Use the rouge dry.

Turn on the receiver and warm up. Place crystal in test oscillator and zero-beat with the receiver. It may be necessary to disconnect the antenna to prevent false beat notes from incoming signals. Note how far crystal must be raised to attain desired frequency. Also note grid current in oscillator. This is for reference later when checking activity. Leave receiver on and remove crystal from oscillator. Remove crystal from holder and place on patch of coarse abrasive. Move crystal in a "figure 8" pattern and maintain a light but even pressure as you count the number of "8's" made. Do not keep crystal in same spot but move it around. After 15 or 20 "8's" stop and set up for step 2.

Step 2.—On the other glass make a patch of the fine abrasive the same size as for step 1. The Kodak abrasive reducer is moist so it can be smeared on. If you use talcum, it will be easier to make a paste if you use a few drops of the water mixed with detergent.

If you use tooth powder, ordinary tap water will suffice, but the detergent mixture is easier to blend. (It is not necessary to use tooth powder that contains chlorophyl.)

Take the crystal and repeat the "figure 8" pattern, but only 5 or 6 times. Pick up crystal and wash in warm, soapy water using the tooth brush gently to clean surface of excess abrasive and foreign matter. Hold crystal by edges between thumb and fingers to prevent

finger marks. When it is clean, rinse brush under water faucet, dip crystal into second container of warm water and brush gently. Repeat the process in the third container of warm water. Dry with lintless cloth and a piece of lens tissue. When clean, handle entire assembly by edges and place between electrodes and then in quick-holder or original holder. Insert in test oscillator and turn on. Check grid current for activity and listen on receiver. If there is no beat note tune receiver towards desired frequency. When you hear note, zero-beat. This gives the amount of increase in frequency. Using this as a guide the number of "figure 8" strokes still needed to attain the desired frequency can be estimated. The amount of change is determined by the size of the "figure 8's" and the pressure, so a change in either will alter the results. When within a few kilocycles of desired frequency use only process two and check frequently to prevent over-grinding.

When crystal is at desired spot, wash again very gently in a lather made from the castile soap and warm water, rinse in clean warm water. Dry with cloth and finish with lens tissue. Do the same with the electrodes. Blow off any dust on crystal, electrodes or in the holder. Close and seal with shellac. The shellac will seal the edges of crystal holder and keep out dust and moisture.

Carbon tetrachloride was used to clean crystals in early tests, but tests indicated that it left a film which affected the activity or oscillation of the crystal. Three crystals finished in carbon tetrachloride lost activity shortly after their frequency had been shifted. After being washed in a castile soap solution they began to work as soon as they were put in the circuit.

A few strokes on the edge of the crystal on the coarse abrasive will usually restore activity in the event it should cease while surface grinding. This raises the frequency slightly, but should not be used as a method of changing frequency.

Lowering Crystal Frequency.—The best method in the opinion of many authorities is silvering. The method is tedious and time consuming but cannot be beaten for permanency. It calls for more effort and time than the author could spare so items in group 4 were used instead.

One crystal had to be lowered 35 kilocycles. Its frequency was checked on the receiver and its activity noted. It was then removed from the holder and placed on a clean sheet of glass. Using the applicator, a drop of iodine was placed on the center of the crystal and spread over the surface. It was necessary to put two drops at a time to completely cover the surface. On the first try the iodine spread to the glass and then to the underside of the crystal. To prevent this a pad of cloth was placed between the glass and the crystal. After the surface of the crystal was dry it was turned over and iodine

applied to the other side. When dry the crystal was rubbed gently with lens tissue and the frequency checked. The crystal had gone down about 4 kilocycles. The application process was repeated 3 more times until the crystal was within 3 kilocycles of the desired frequency. A drop of mercurochrome then was applied to each side. This time a check showed the crystal was about 1 kilocycle too low. The crystal was washed in castile soap and dried rapidly with a cloth and tissue. This time it checked high but less than 1 kilocycle. A small spot of solder, prepared according to instructions in group 4, was used to make a small circle about one-eighth inch in diameter on the center of the crystal. Test of the crystal now showed it to be within 50 cycles of the desired frequency.

Other crystals have since moved the same way, with variations of the above method. For slight changes of only a few kilocycles, mercurochrome or a small dot of solder on the crystal works fine. For 10 to 20 kilocycles change, a spot of solder one-half inch in diameter plus a coat of iodine usually brings the frequency close enough to finish with mercurochrome. For changes over 20 kilocycles, 4 or 5 coats of iodine on each side plus a little solder usually will produce the desired result.

Editor's note.—AF9PZM reports that his MARS NCS used to advise him he was off as much as 500 to 1,000 cycles when he depended on VFO. Now, using his adjusted crystals, he receives a report of "well within 100 cycles." AF9PZM adds he normally is on frequency foa 5 hours at a time and the report at the end of operating time is the same.

WARNER-ROBINS TORNADO

Bernard Maloney of Fitchburg, Mass., heard in a radio report of the Warner-Robins Air Force Base tornado, that the next door neighbor of his wife and four children, residents of Warner Robins, had been killed. He tried for 36 hours to learn some news of his family, without avail. An appeal for help to the Fitchburg radio station was relayed to the MARS station at Fort Devens, Mass. Maj. Howard Carpenter, post signal officer, authorized W.O. George T. Via, Sgt. George H. Freeberg and Pfc. William W. Green to use the post MARS station and call the Warner Robins area on the amateur bands. An hour and a half later Maloney had word, relayed from the Fort Benning MARS station, that his family was safe.

MARS AND CIVIL DEFENSE

The editorial on page 3 of this issue outlines the work of the MARS Advisory Committee which is studying the coordination of MARS and Civil Defense. By joint agreement the Department of Army and the Department of Air Force have issued the policy indicated below to military commanders in the interest of providing guidance relative to civil defense planning.

"Within the scope and mission of the MARS program as approved and published, the use of MARS facilities as a military communications asset in support of civil defense will be governed by these policies. Within the current availability of personnel and equipment MARS may—

a. Make available communications services between the military forces in support of civil defense and the civil defense agencies.

b. Make available communications services for civil defense forces on a temporary or emergency basis when such services are not otherwise available.

c. Make available radio terminal facilities at designated military installations for civil defense tie-in as required.

d. Make these services available on military frequencies assigned to established MARS networks."

The military requirement for MARS and the availability of personnel, equipment, and frequencies during periods of national emergency will govern the extent to which MARS services can be made available to civil defense agencies.

A survey will be conducted by MARS in order to determine those civilian members who will be qualified and willing to participate in this communications support mission.

A MESSAGE FROM KOREA

At La Mesa, New Mexico, a housewife received a telegram from the Department of Defense telling her that her son was reported wounded in action. Only a few hours later a MARS message, relayed via Japan, was delivered through the MARS network and station A5UAR informing her that although he was hospitalized "there's nothing to worry about, Mom." This is typical of the third-party traffic handled daily on MARS circuits. Most messages of this kind require 24 to 48 hours for delivery.

263670°—53——2

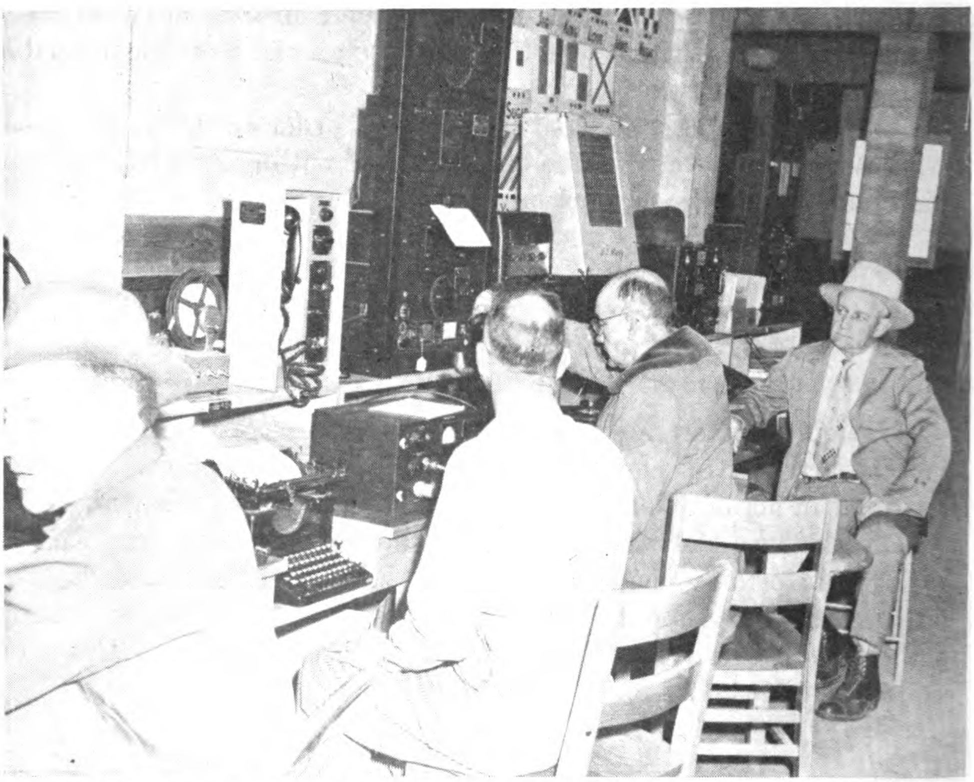
BLUE MOUNTAINS RESCUE SERVICE

JOHN M. CARROLL, (A7BUS)

Plans of the Pendleton (Oregon) Amateur Radio Club for an integrated radio operation of amateurs and MARS members were tested 9 March 1953, and came through with flying colors.

In cooperation with the Oregon State Board of Aeronautics and the United States Coast Guard an air search rescue operation was planned and executed. A mock-up of a wrecked aircraft was placed on a ridge in the southern part of Umatilla County, Oregon, partially hidden in a spot decided upon by Capt. Jim Maloney (AF7NWE), USAFR, and Mr. Cliff Crum, Associate Area Designee for the Oregon State Board of Aeronautics, communicator and official observer on the searching aircraft.

At 0800 P. s. t. on 9 March 1953 PARC stations were activated. Herb Clarke (A7ADX) operated the communications headquarters station using his own call. John Kucera (AF7KZF) operated the search headquarters station using A7ADX portable. Captain Maloney operated A7BUS at the scene of the mock crash and Bob Ratliff (A7PZM) operated from the Lexington, Oreg., airport, 60 miles west, where he checked in and forwarded reports of aircraft landing there after assigned area searches.



John Carroll (A7BUS), Harold Brock (W7KR), Herb Clarke (A7ADX) and Sheriff Roy Johnson of Umatilla County at search headquarters station.

Lieutenant Commander Sanders, Lieutenant Commander Norris (Coast Guard), Howard Arthur (Key Area Designee, Area 14, Oregon), Jack Bartlett, Director of Oregon State Board of Aeronautics), and four crewmen of the search aircraft.

Harold Brock (W7KR), H. H. Shoop (AF7KTF), Ray Adams (W7LQV), Dick Putney (W7PHM), Blair Coleman (W7FLS) and others were alerted for operations in the field with ground parties.

The plane was spotted at 1100 P. s. t. by one of the pilots. Shortly thereafter a number of ships flew over the area, each acknowledging the discovery and duly reporting in to observers on the ground.

Letters of thanks and appreciation were received by the Pendleton Amateur Radio Club from the Oregon State Board of Aeronautics and United States Coast Guard.

The story of this integrated rescue communications system began 18 months ago. In December, 1951, Stanley Lott of Walla Walla, Wash., flying a Beechcraft Bonanza, became lost in the overcast over the Blue Mountains of Eastern Oregon. He disappeared from the radar screen and after approximately 30 minutes was presumed to have crashed. The Oregon State Board of Aeronautics alerted the Pendleton radio station and requested that information be passed along if an aircraft was heard in the area.

Next morning members of the Pendleton Amateur Radio Club

John Kucera (AF7KZF), U. S. Forest Service, at BC 654 in link between Search Headquarters and the Communications Center.

gathered available equipment, set up a control station in the hangar office at Pendleton Field and put mobile search parties in the field operating on 75 and 10 meters. When the wreckage was spotted next day about 20 miles southeast of Pendleton, PARC had been joined by amateurs from Walla Walla, Wash. The local unit of the National Guard was alerted and joined in the search.

The operation was an eye-opener for PARC members who resolved to improve their potential rescue facilities.

The PARC was reorganized into mobile, portable, club station and house committees. The emergency coordinator for the club assumes command in event of an emergency.

Discussions at PARC meetings centered around improved rescue communications. Problems studied, based on actual operations at the time of the Lott search, included:

a. Location of the communications center in the hangar near the search office was an error; local interference, both radio and personnel, was terrific.

b. Neither the 75 nor 10 meter equipment in use was standard enough to zero-beat with the control station for single channel operation.

c. National Guard equipment available was not capable of operating in the amateur bands used, thus precluding communications with the central control station.

d. Air-to-ground communications, outside of official CAA channels, was not good. A relay station had to be established at a nearby town to send in dropped messages and to relay on 75 meters those messages originated on the 10 meter circuits with terminal facilities in deep canyons.

e. In the morning and early afternoon the lower frequencies worked out very well but in the evening interference was encountered from W5's and W9's.

Cliff Crum (Associate Area Designee) watches circling aircraft at the scene of the simulated wreck.

f. Amateurs who checked into the emergency net were willing, but caused additional confusion.

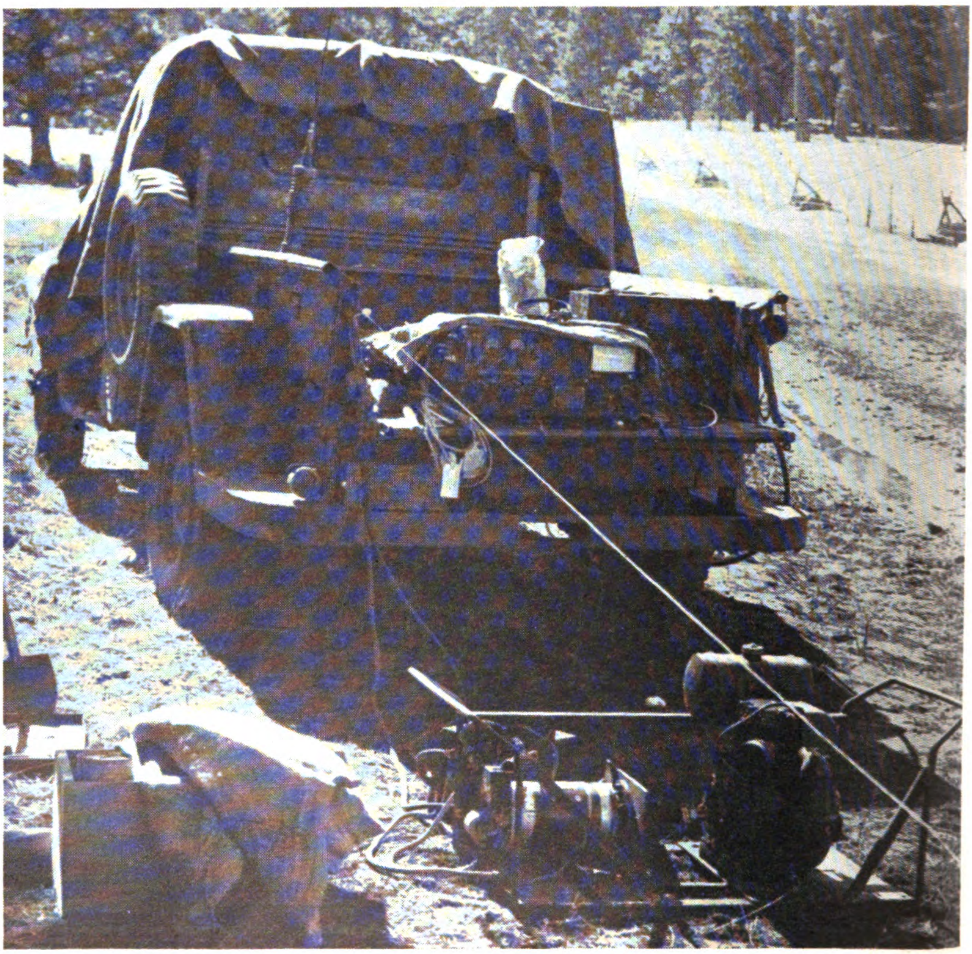
g. There was an overall lack of organization and proper operating procedure. Some stations had previous experience, but phonetics were different, "Q" signals were improperly exchanged, and most of the work at the central station fell on 2 or 3 men.

h. Because no operational record was kept, it was theoretically possible for an operator assigned to have been lost without others in the system becoming aware of it.

PARC members decided, where possible, to use BC–654's for portable or mobile work. Mark IV tank transmitters were considered, but were rejected because they require more batteries.

MARS members in the club advocated single channel operation wherever possible, A7BUS and AF7NWE made requests to Sixth Army and Air Force for permission to operate circuits on 4025 kilocycles and 3307.5 kilocycles respectively if emergency conditions were experienced and if the frequencies were not required by the military.

In February, 1953, Mr. Arthur, key area designee for the Oregon



Emergency equipment of Capt. Jim Maloney (**AF7NWE**).

State Board of Aeronautics, invited the PARC to participate in the March test. Here was the opportunity to try out the integrated system. The Pendleton club station was not yet ready for occupancy, but local Navy training facilities were made available by Comdr. Robert Helm, USNR. A BC–610 was set up on 4025 kilocycles, using it on low power.

It was planned to use portable telephones between search headquarters and communications headquarters, but equipment was not at hand so a radio link was employed. Almost any frequency would have been usable at the half-mile distance, but since many interested parties were monitoring, it was decided to put a BC 654 on 4025 kilocycles with the understanding that if it became necessary to put more portable units in the field another frequency would be used.

The success of the operation has already been described. After the station was secured a conference was called. From that conference and a general critique held at the next PARC meeting the following conclusions were announced:

a. A closer liaison between Civil Defense headquarters and the radio club should be maintained.

b. A list of alternate frequencies should be maintained.

c. While elaborate equipment was used, a better receiving position outweighed the value of the equipment.

d. For short distances and portable use, high frequency sets were good, but for general purpose work the lower frequencies were better. In the late afternoon frequencies in the 160 meter range prove even better than 75 meters.

e. Several low powered transmitters are better than a lesser number of high powered ones.

f. A greater choice of antennas near the frequency desired is better than using various loading devices, on lower powered transmitters.

g. A few VHF transceivers are desirable for radio links from aircraft to ground.

h. Frequent drills of this same type are needed.

i. During the operation it is necessary to announce frequently that "this is a simulated emergency."

NEW PRECEDENCE PROSIGNS

The following precedence prosigns became effective on 1 July 1953:

FLASH	Z
EMERGENCY	Y
OPERATIONAL IMMEDIATE	O
PRIORITY	P
ROUTINE	R
DEFERRED	M

274N SERIES RECEIVER CONVERSION

ROBERT R. JESSUP, AF8FAG

Slight variations in the normal conversions of the 274N series receivers have been found to improve the operation of the receivers. In the plate circuit of the 6SR7, second detector-first audio, it is found best to use a 250,000-ohm resistor from plate to B+. A 100-$\mu\mu$f. condenser is connected to ground from the plate.

Generally the BFO coil and allied parts are removed in order that the triode section of the 6SR7 may be used as the first audio tube. In our latest conversion of the BC–454, the BFO coil is left in but disconnected from the 6SR7. The dynamotor mounting studs are removed from the rear of the receiver chassis. A seven-prong miniature socket is installed in one of the dynamotor stud holes for a 6C4 tube. The BFO coil is then wired into the 6C4 socket. A switch from the CW shutoff line to ground completes the installation.

SELENIUM RECTIFIERS

Improper handling, abuse, or malfunctioning of selenium rectifiers can result in serious injuries and illness to personnel.

These rectifiers are normally very reliable when operated within rated voltage and current limits. However, a circuit or rectifier malfunction causing failure of the rectifier will cause liberation of selenium dioxide fumes. *These fumes are poisonous* and must not be inhaled. Concentrations greater than 0.1 part per million may cause lung damage and serious liver disease. Skin contact with selenium compounds may cause absorption of the material through the skin or give rise to contact dermatitis.

When malfunction of the rectifier occurs, the damaged rectifier should not be handled while it is hot, in order to avoid inhalation of poisonous fumes or absorption of poisonous selenium compound through the skin.

AA4WDK CHOP WINS AFCA AWARD

Cadet Captain Claude S. Simpson of 152 Ash Street, Forest Park, Ga., has been named winner of the Armed Forces Communications Association award at Clemson Agricultural College. The award is made by the AFCA to outstanding Signal Corps ROTC students.

Cadet Captain Simpson was a senior Arts and Science student during the 1952–53 school year. He was active in communications work and served during the year as Chief Operator of the Clemson College MARS radio station (AA4WDK).

A2NUI

HOW TO BEAT QRM, QSB

JACK McGRATH, A2NUI

One Sunday while the New Jersey "Sugar" net was in operation interference from locals and "Able Threes" made successful operation almost impossible. A2NUI, monitoring the MARS net, decided to try an experiment. The next Sunday he was ready for operation with a Wilcox-Gay Recordio hooked to the loud speaker. A2NUI checked into the net. AA2USA, A2USA and AA2WAO all had traffic for him. The recorder was turned on and AA2WAO started to send. At this time other stations, apparently not able to hear AA2WAO, were breaking things up so badly that NUI could not copy on the mill. After AA2WAO signed, he was asked to wait. The playback was started; every word was on the tape loud and clear.

A2NUI's recorder also finds an important use in the Bayonne, N. J., Civil Defense net, for training and critique. Not long ago a drill for the mobiles was held. Many of the mobile operators completely disrupted the net by calling the NCS while the net was in operation. (As a mobile would hit a "dead spot" he could hear nothing and would begin to call NCS.) When all stations had reported to headquarters after the drill the recording of the entire drill was played back for them. As the mistakes were replayed it caused a few red faces, but has resulted in improved net discipline.

263670v—53——3

MARS PARTICIPATION CONTEST

Winners in the MARS (Army) participation contest concluded December 31, 1952, have been determined. The list of Air Force winners was not complete at press time but will be announced later.

Competing stations were divided into two categories—military and nonmilitary. A first and second place award was offered in each category for the First, Second, Fourth, Fifth and Sixth Armies. The Third Army conducted similar contests earlier in 1952. Results of the earlier contests were announced in the Third Army MARS BULLETIN.

Awards, consisting of correspondence courses with the Cleveland Institute of Radio Electronics were made available through the cooperation of CIRE Vice President Edward H. Guilford, a former military communicator, one of the first air service communications officers in the 1917–1924 period. Winners have up to 3 years to complete the courses selected.

The Chief, MARS (Army) and MARS Command Directors were not permitted to compete for awards. Staffs or operating personnel of the Chief, MARS and MARS Directors were eligible in the nonmilitary category only, using their home stations.

Members competed with other members within their own Army area.

Selection of winners was based on participation points, awarded as follows:

1. WAR/AIR Broadcast: Contestants copying an original transmission from MARS Headquarters received 50 points; those copying a rebroadcast each received 20 points.
2. Operation in C. W. drill nets was worth 20 points per 1 hour drill.
3. Operation in phone drill nets was worth 8 points per 1 hour drill.
4. Contestants received 5 points for prompt submission of participation reports, correctly prepared, and submitted to the MARS Director prior to the fifth of the month.
5. Points were awarded for articles submitted and accepted for use in Army area MARS publications and the MARS BULLETINS. Technical articles—150 points maximum; nontechnical—50 points; news stories—5 points; news items—2 points. (MARS Directors evaluated material and assigned points.)
6. Each new member recruited by a contestant was worth 15 points.
7. In Army areas designating a station-of-the-month, 40 points were given for earning this award. For multioperator stations the total of 40 points was divided equally among regularly assigned operators.

8. Contestants received 1 point for each message sent and 1 point for each message received.

Within each contest area the two first prize winners received a complete home study course consisting of a choice of either Nilson's Master Course in Radio Communication, or Smith's Advanced Radio and Communication Engineering.

Second Prize winners received their choice of one complete section from either of the above home study courses.

Winners are—

First Army

1st place—Capt. Marcel C. Reeds (military) A2LRW, 3,324 points. Mr. William Auld (nonmilitary), A2DXD, 2,012 points.

2d place—Capt. Bryant G. Richardson (military) AA2WAO, 895 points. Mr. Edward G. Davis (nonmilitary), A7KVB, 805 points.

Second Army

1st place—M. Sgt. Viole W. Price (military), AA4WBG, 7,552 points. Mr. Robert E. Fields (nonmilitary), A4SBI, 2,501 points.

2d place—Cpl. Lawrence ~~K.~~ Wartell (military), AA4WDO, 1,520 points.

Fourth Army

1st place—Mr. Norman T. Wehrli (nonmilitary), A5JPC, 6,946 points. Mr. Keith T. Maring (nonmilitary), A5KSW, 5,420 points.

Fifth Army

1st place—Mr. Virgil H. Houser (nonmilitary), A9KTX, 2,371 points.

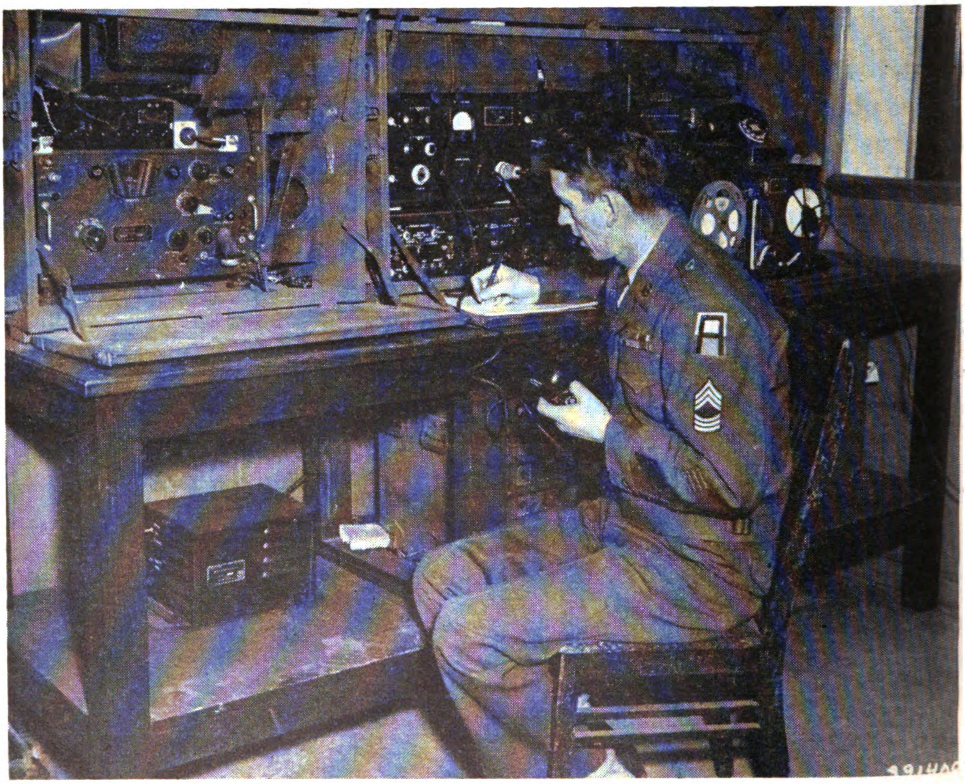
2d place—Mr. Arno L. Fahsholtz (nonmilitary), AØFDJ, 1,709 points.

Sixty Army

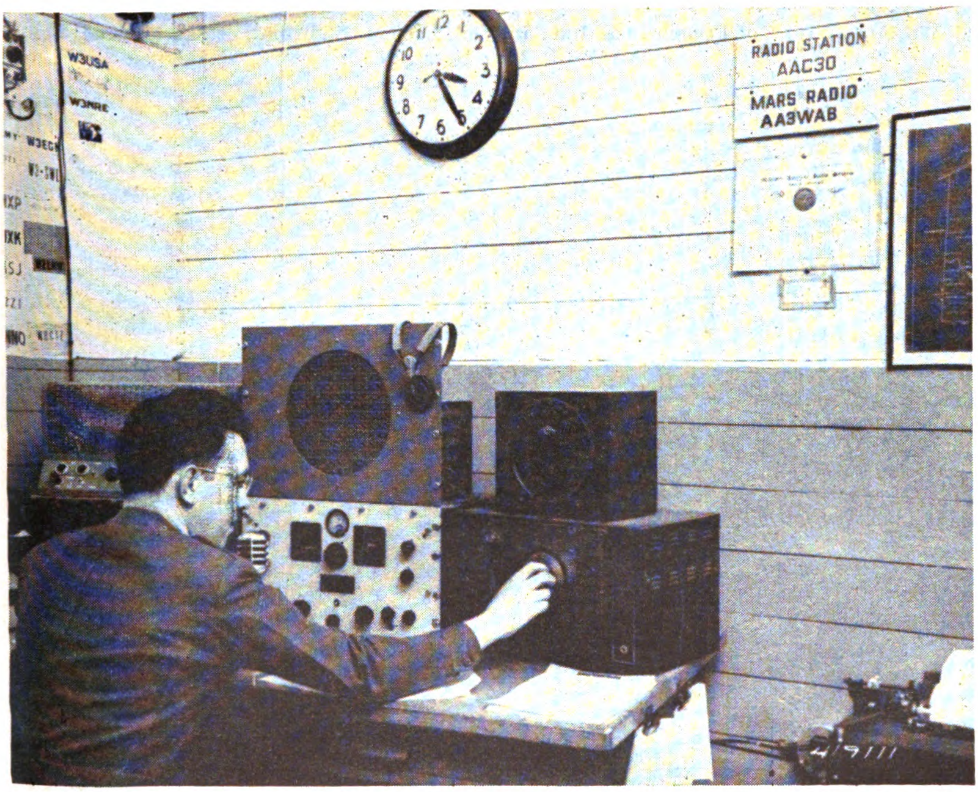
1st place—Mr. Ira C. Bechtold (nonmilitary), A6NCP, 1,481 points.

2d place—Mr. Edward F. Conyngham (nonmilitary), A7ESJ, 1,278 points.

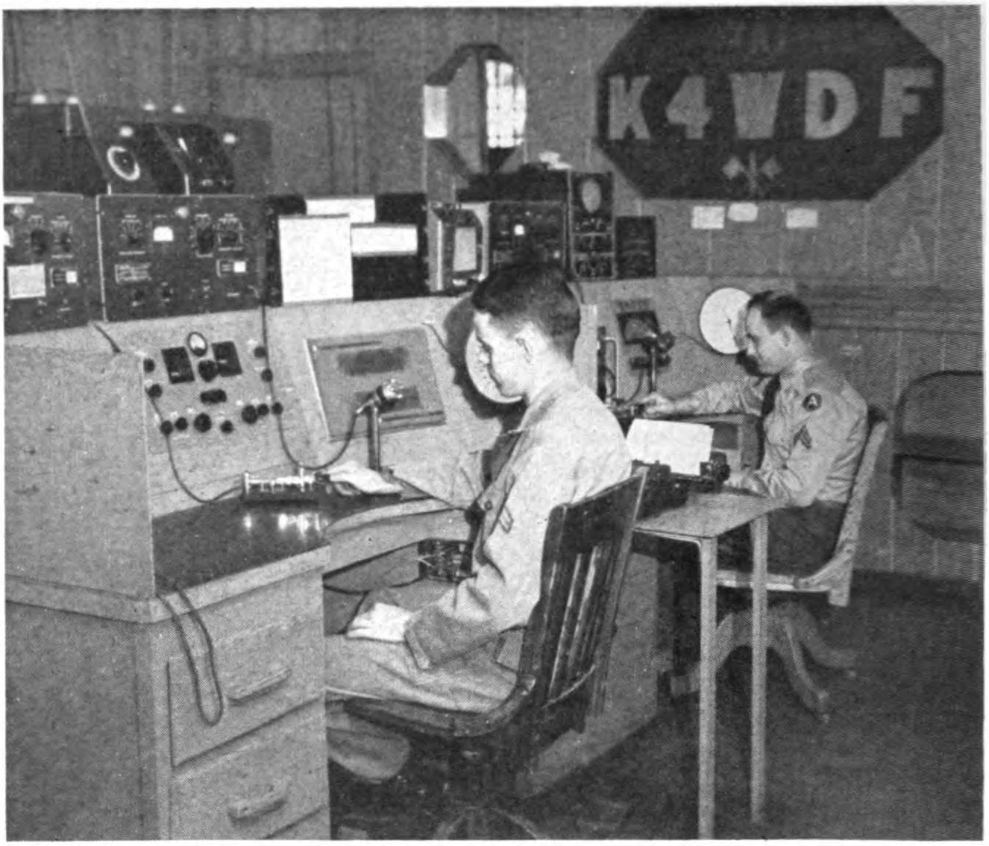
ABOVE. Cpl. Martin L. Justice, Pikeville, Ky., at MIT MARS STATION AA1WAH. BELOW. M. Sgt. Roy H. McAdoo, of Mayfield, Ky., at MARS ROTC Station AA1WAH.



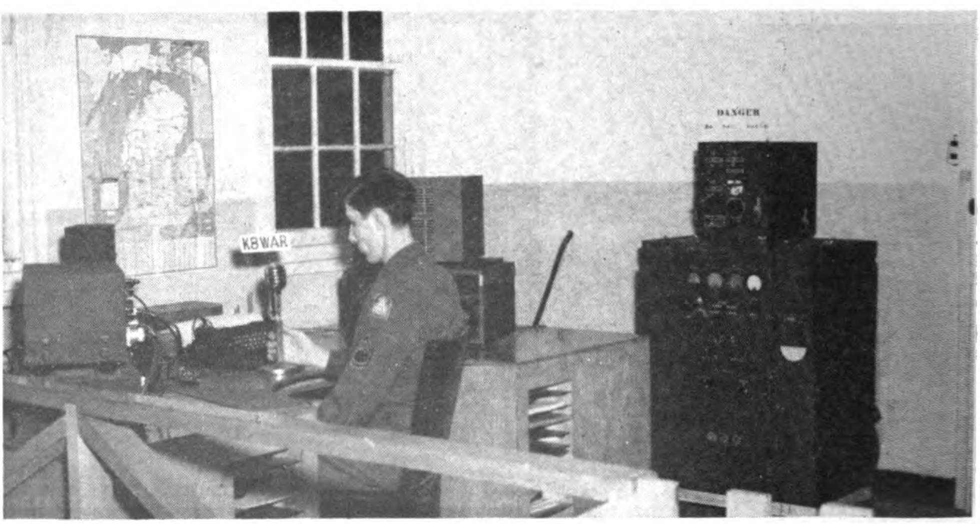
Headquarters Second Army MARS Station, Fort George G. Meade, Md.



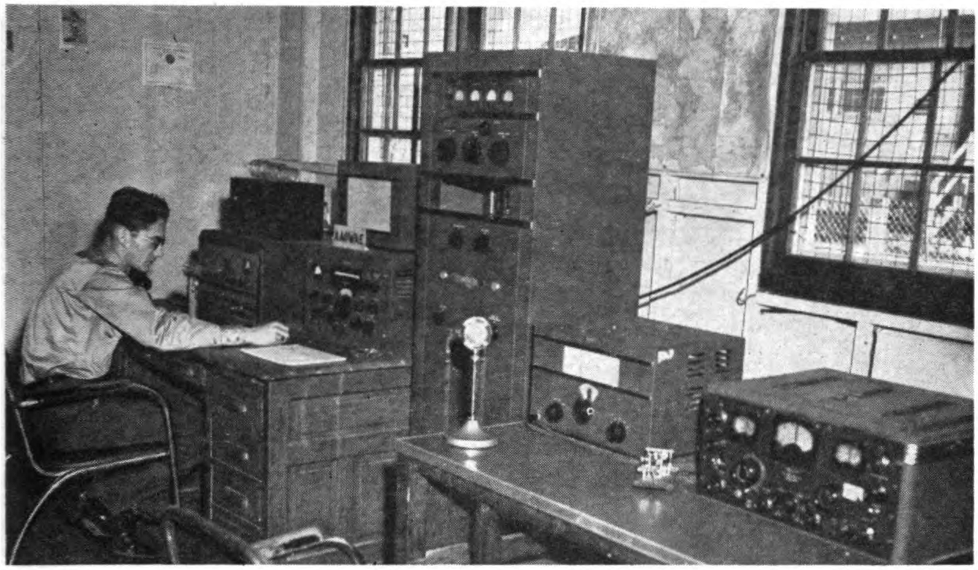
Sgt. First Class William A. Diamond operates AA3WAB, Headquarters Pennsylvania Military District.



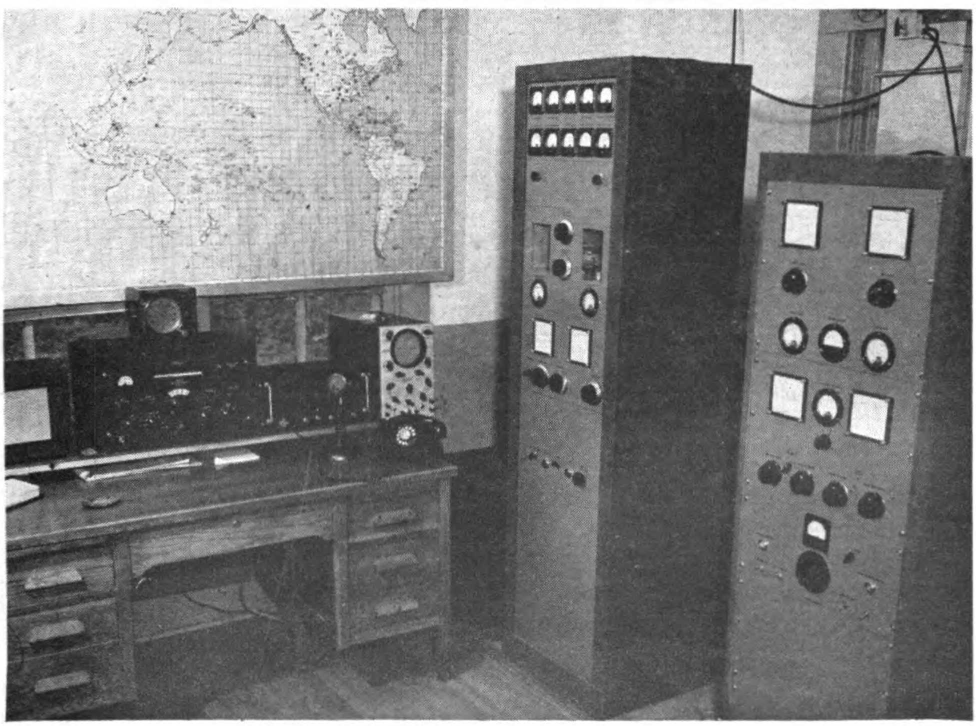
Cpl. William A. Tarr, of French Lick, Ind., and Cpl. Fred M. Lightfoot, of San Marcos, Tex., at AA4WDF, Fort Bragg, N. C.



AA8WAR is located in the radio room at Fort Custer, Mich.



Cpl. Stanley Woolston at the controls of Fort Ord's MARS Station AA6WAE, Pacific Heights, Fort Ord, Calif.



MARS Station AA7WBC at Fort Huachuca, Ariz.

Col. Frank E. Herrelko, Director of Communications and Electronics EADF, and Maj. Gen. Morris R. Nelson, Commanding General EADF at AF2FAL.

EADF MARS HEADQUARTERS STATION

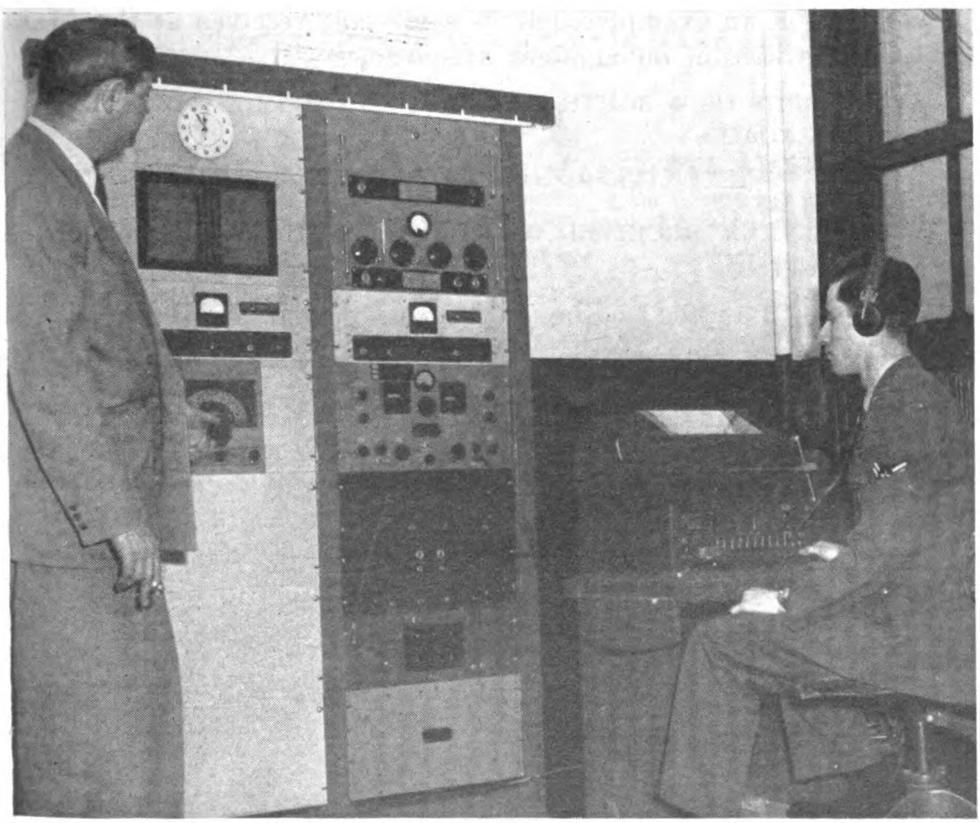
When the Eastern Air Defense Force MARS station at Stewart Air Force Base, New York, was dedicated in February of this year Maj. Gen. Morris R. Nelson, Commanding General, EADF, was present to inspect the facilities and address EADF units via MARS from AF2FAL. Capt. Hubert S. Stees, Jr., MARS Director, EADF, was host to the General and his staff. Ted Arken, station supervisor directed the seven-station net.

General Nelson said 70 percent of all EADF units now have active MARS stations. All air divisions, all but two of the defense wings and the majority of the fighter and AC&W squadrons are actively participating in the EADF MARS program, the General announced. The objective is 100 percent participation.

AF2FAL established temporary boat-shore-base circuits to handle search operations last November when a C–45 crashed into the Hudson River off Newburgh.

The operating room at AF2FAL contains a console with three separate positions. On 1 side of the room are 2 racks flush-mounted in the wall containing a 400-watt transmitter, a TG–10 code practice keyer unit and a converted BC–625 VHF transmitter for 2-meter operation. Across the room, also flush mounted in the wall is a kw. transmitter made from the framework of a salvaged T–4/FRC power supply and using a pair of 250TH tubes in the final, modulated by a pair of 810's. The power supply uses four 866 rectifiers connected in a bridge circuit to furnish 2500 v. d. c. at one-half amp. The rig is protected by interlocks. In the event of an interlock failure, every opening has a warning light to show that the 110-volt a. c. primary circuit is alive.

A radioteletypewriter position is mounted in two racks. This also is flush mounted in the wall. One rack contains a frequency shift exciter, modified RM–6J speech amplifier, BC–1004 receiver, home-made FSK receiving converter and power supply, and central control panel containing necessary switches and relays. In the other rack are a clock, speaker for the BC–1004, another modified RM–6J used as a line amplifier for calling system, transmission monitor. It also furnishes 40 volts d. c. for the internal phone system within the station.



TED ARKEN AND AF2FAL OPERATOR

MARS REFILE PROCEDURE

From time to time examples of improperly transmitted messages are brought to the attention of the Chiefs, Mars. Usually these mistakes are the result of improperly refiling a message. Occasionally incomplete headings are found also.

To clarify the proper refile procedure for placing Mars messages into amateur form or for accepting amateur or other non-Mars messages and introducing them into the Mars several examples have been prepared by Mars headquarters. It should be remembered that the responsibility and the burden of correctly refiling the message is a Mars operator responsibility. Military specifications must be met. Amateurs or other radio operators outside the military cannot be expected to know military radio procedures. Mars members must know both military and amateur procedures.

Normally, personal messages (third party traffic) suitable for transmission via amateur circuits are originated in ARRL form. If a Mars station transmits the message via Mars, he places a Mars refile heading on the message. If the message requires relay, the relaying station will handle as military traffic if he transmits it on a Mars circuit, or will delete the refile heading entirely and transmit as an amateur message if sent on an amateur circuit.

Let's look at an example: This is a message received at the Mars headquarters station on amateur frequencies—

NR 6 W9PDS CK 9 SOUTH BEND IND 2130 MAY 5
TO JOHN ADAMS
324 FERNDALE AVE
ATLANTA GA $\overline{\text{BT}}$
YOUR LETTER RECEIVED X WILL EXPECT YOU JUNE THIRD
$\overline{\text{BT}}$ ART $\overline{\text{BT}}$

Now, let's put a refile heading on the message and send it from Mars headquarters to Fort McPherson, just outside Atlanta, Ga. We have—

A4USA DE WAR NR18
NM-Ø613ØØZ
FM WAR WASH DC
GRNC $\overline{\text{BT}}$
NR6 W9PDS CK9 SOUTH BEND IND 213Ø MAY 5
TO JOHN ADAMS
324 FERNDALE AVE
ATLANTA GA $\overline{\text{BT}}$
YOUR LETTER RECEIVED X WILL EXPECT YOU JUNE THIRD
$\overline{\text{BT}}$ ART $\overline{\text{BT}}$

MARS TO AMATEUR

It is also necessary for MARS members to know how to refile messages which originate as military messages in order that they may be transmitted on the amateur bands.

Third party messages originating at overseas MARS stations will be reoriginated as amateur messages by the stateside MARS station introducing them into the amateur bands. Third party messages originating in the United States will be refiled if necessary for delivery.

Here's how it works—a message comes to MARS headquarters station from Casablanca on a regular traffic net. The message addressee lives in Kansas—

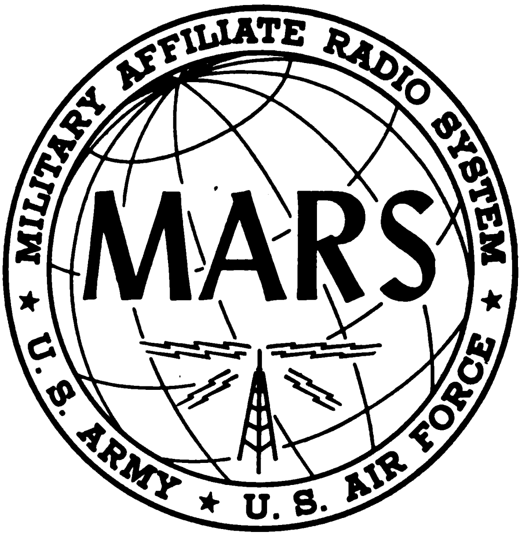
WAR DE AJ5AB NR21
NM—Ø81223Z
FM AJ5AB FRENCH MOROCCO
TO MRS JOHN DOE
123 SPRING DRIVE
KANSAS CITY KANSAS
GR1Ø $\overline{BT}$
PACKAGE AND LETTER RECEIVED PD LETTER FOLLOWS PD SGD JACK $\overline{BT}$

In order to transmit this message on an amateur frequency the WAR operator would refile the message like this—

NR31 K4USA CK7 FRENCH MOROCCO VIA MARS 1223 MAY 8
TO MRS JOHN DOE
123 SPRING DRIVE
KANSAS CITY KANSAS $\overline{BT}$
PACKAGE AND LETTER RECEIVED X LETTER FOLLOWS $\overline{BT}$ JACK $\overline{BT}$

You will note that the message now has an amateur station file number, a new group count (signature is not part of the text in amateur procedure), an X for punctuation (pd is used only by the military), and the country of origin is shown. If Mrs. Doe wishes to reply, the station which made delivery will know at once that it can accept the message and will send it to French Morocco via MARS. MARS stations, in turn, will relay the message to the appropriate station in the system for routing to French Morocco.

Use of his procedure puts responsibility for message conversion on the MARS stations. Amateur stations never should have to handle a message with unfamiliar elements in the heading.



THE OFFICIAL MARS SEAL

MARS SEAL CONTEST

MARS has a new seal. And the MARS Advisory Committee which made the final determination agreed during their deliberation that it was mighty hard to choose a "best" from the many excellent entries submitted in the seal contest. Eighty-seven entries were received from MARS members.

All proposed seals were carefully screened at MARS headquarters. The Chiefs, MARS finally were able to narrow the choice down to seven and these were submitted to the MARS Advisory Committee. Col. William D. Hamlin, Chairman, appointed three members of the MARS Advisory Committee to make the final selection.

After several meetings and much study, a composite—incorporating features of five proposed ideas—was recommended to the Committee and adopted at a quarterly meeting on 7 April 1953.

The contest was open to all MARS members. Rules stipulated that the seal design should represent the Army Signal Corps, Air Force Communications and radio communication in general. They also specified that designs should be circular in shape. There was no limit to the number of entries each member could submit. Closing date was midnight, 1 December 1952.

One consideration which eliminated many excellent entries was the element of reduction. In order to make the seal adaptable for as many uses as possible; i. e., lapel emblems, QSL cards, letterheads, etc., it was necessary that the design be kept simple and free from detail or lines which might be lost in reduction.

The MARS seal is a composite of designs submitted by Lt. Col. Philip Sansone (AG1AC), Pfc. Harold White (A2USA/OPR), 2d Lt. Robert Bremer (A6HMG), S. Sgt. John Brewer (AF8FNR), and Eugene Sydlowski (AF9FAW).

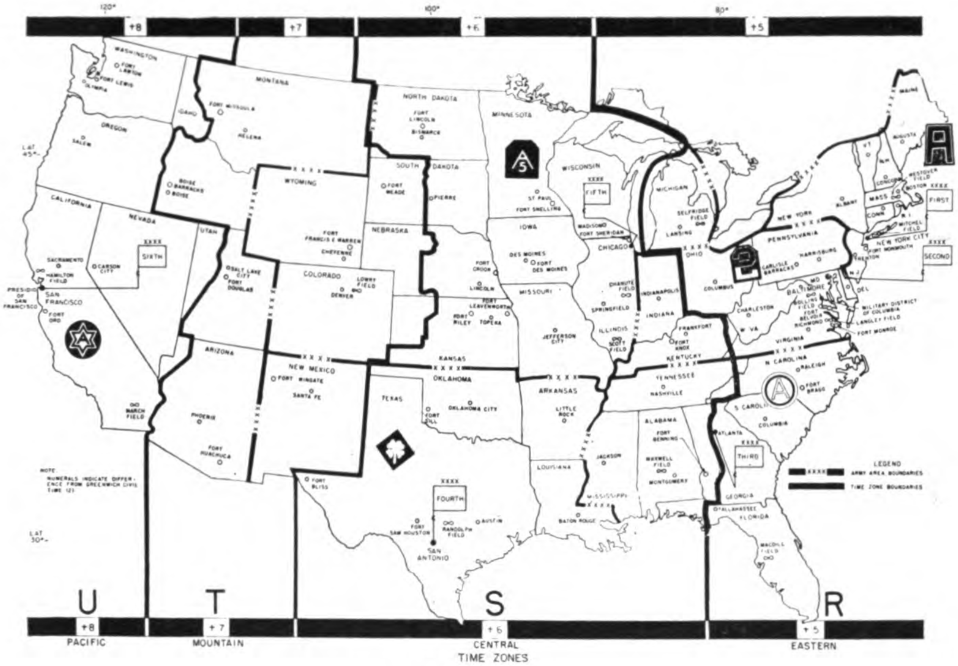


FIGURE 1.

TIME ZONES

Time as it is used in military messages is expressed in standard time in a fixed time zone designated by a letter. Normally, fixed stations, working point-to-point schedules will use "Z" time which is the Standard time at Greenwich, England, and the basis for all local time zones. Standard time for Washington, D. C., or New York City is "R" time. Eastern daylight time becomes 1 hour earlier, or "Q" time.

When calculating standard time at any point in the world, the globe is arbitrarily divided into 24 zones of 15° each, or—in terms of time—1 hour apart. Greenwich mean time, or zero meridian, extends from 7½° east longitude to 7½° west longitude. Although time zone boundaries have been established to coincide with longitudinal meridians, they have been modified to correspond with national or regional boundaries.

To simplify the calculation of standard time at any point on the globe, time zones are lettered and numbered in sequence (see fig. 1). These zones lying east of zero zone are lettered A through M, omitting J, and are numbered minus 1 through minus 12 respectively. Those zones lying west of the zero zone are lettered N through Y and are numbered plus 1 through plus 12 respectively.

Because of the cumulative effect of gaining or losing time when traveling either west or east, two points on the globe may have a time difference of 24 hours Therefore, a line which generally corresponds to the 180° meridian, is called the International Date Line.

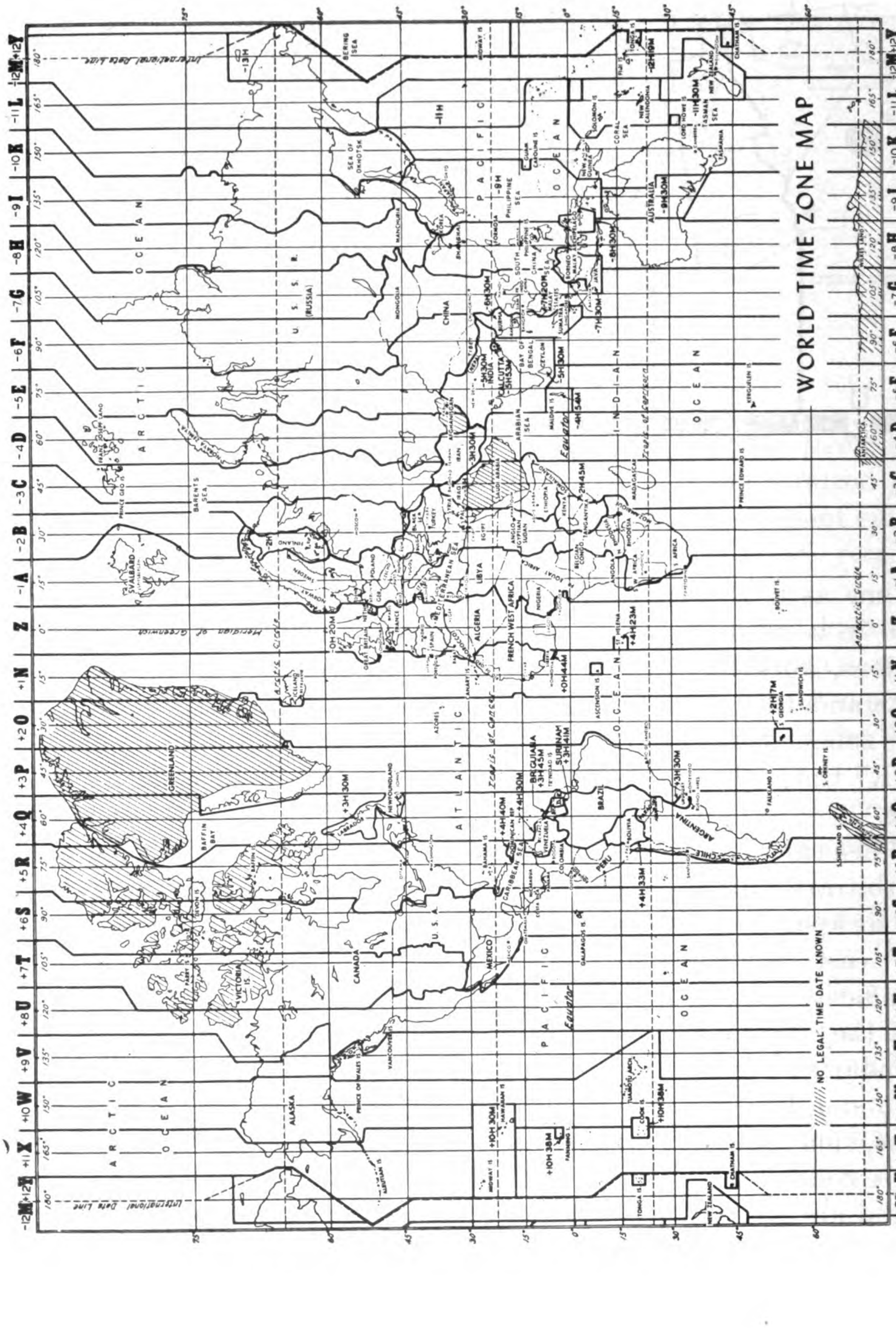

WORLD TIME ZONE MAP
NO LEGAL TIME DATE KNOWN
International Date Line
Meridian of Greenwich
Equator
ARCTIC OCEAN
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN

FIGURE 2.

TABLE OF TIME ZONES, ZONE DESCRIPTIONS, AND SUFFIXES

Zone	Desc.	Suffix	Zone	Desc.	Suffix
7½ W. to 7½ E..........	0	Z	7½ W. to 22½ W........	+1	N
7½ E. to 22½ E.........	−1	A	22½ W. to 37½ W........	+2	O
22½ E. to 37½ E........	−2	B	37½ W. to 52½ W........	+3	P
37½ E. to 52½ E........	−3	C	52½ W. to 67½ W........	+4	Q
52½ E. to 67½ E........	−4	D	67½ W. to 82½ W........	+5	R
67½ E. to 82½ E........	−5	E	82½ W. to 97½ W........	+6	S
82½ E. to 97½ E........	−6	F	97½ W. to 112½ W......	+7	T
97½ E. to 112½ E......	−7	G	112½ W. to 127½ W......	+8	U
112½ E. to 127½ E......	−8	H	127½ W. to 142½ W.....	+9	V
127½ E. to 142½ E.....	−9	I	142½ W. to 157½ W.....	+10	W
142½ E. to 157½ E.....	−10	K	157½ W. to 172½ W.....	+11	X
157½ E. to 172½ E.....	−11	L	172½ W. to 180	+12	Y
172½ E. to 180........	−12	M			

Letter M is also used to designate −12 this is to provide for a ship in zone −12 keeping Daylight Saving Time.

The table below provides a quick and accurate method for converting time in one zone to time in any other zone.

Vertical columns indicate time zones. Zone Z is GCT (Greenwich Civil Time). Time in each successive zone to the right of zone Z is one hour later, to the left of zone Z is one hour earlier. Time in each successive shaded area to the right is one day (24 hours) later, to the left is one day (24 hours) earlier.

Thus, to determine the time in zone K when it is 1200 hours in zone Q, proceed as follows: Find 1200 in column Q, and read across to numbers (0200) in column K. Since 0200 is in a shaded area to the right, the time is 0200 hours one day later (tomorrow).

	+12 Y	+11 X	+10 W	+9 V	+8 U	+7 T	+6 S	+5 R	+4 Q	+3 P	+2 O	+1 N	0 Z	−1 A	−2 B	−3 C	−4 D	−5 E	−6 F	−7 G	−8 H	−9 I	−10 K	−11 L	−12 M	
PREVIOUS DAY	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	SAME DAY
	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	
	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	
	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	
	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	
	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	
SAME DAY	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	NEXT DAY
	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	
	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	
	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	
	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	
	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	
	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	
	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	
	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	
	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	
	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	
	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	
	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	
	1600	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	
	1700	1800	1900	2000	2100	2200	2300	2400	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	

FIGURE 3.

BEAMED OUR WAY

FORT KNOX, KY.

Those of us in MARS who are interested primarily in traffic handling are missing a good bet, that is, increasing interest in MARS traffic by use of a BPL certificate similar to that given by ARRL. . . . We have individual stations reporting in to SNCS; the SNCS reports into the area net; the area net can report in to WAR or AIR. . . . message points could be counted in the same manner as for amateur nets—one point each for originations, received, relayed and delivered messages. The goal could be set at 250 points total or 50 points for originations plus deliveries. Stations having the highest total for the month in each area could be given special mention as "Traffic Station of the Month". All stations could compete for a yearly award of the "MARS Traffic Station of the Year."

BILL PRICE AØMWV
CHOP AA4WBG

FM A6GQY
TO A6USA
INFO AD1FEC
THIS STATION HAS RECEIVED WORD FROM MGRS EASTERN AREA CMM CENTRAL AREA AND PACIFIC AREA ARRL NETS COMPLIMENTING A6USA CMM A6GQY and AD1FEC FOR THE RAPID AND EXCELLENT SERVICE THEY HAVE BEEN RECEIVING ON PACIFIC INCOMING AND OUTGOING TRAFFIC PD Ø3 MARCH 2229Z LB

SIOUX FALLS, S. D.

I wish to thank you for any action you may take toward perpetuating the MARS Bulletin. I believe such a publication is necessary in our program. I will suggest that in future publications, some sections be specifically pointed toward nonmilitary MARS members . . . . . . some of us feel like orphans in the organization, and this is not intended. I'm also glad to note that SIG 439-1 is being replaced by a Signal Operation Instructions . . . I wrote about a year ago that SIG 439-1 was unwieldy for those of us who had not worked with the military previously. Also . . . . . I'd like to see a series on antennas in the Bulletin.

J. W. "TONY" SIKORSKI, AØRRN

JEFFERSON, N. Y.

I submit the following as constructive criticism of your magazine for which I hope you will not feel offended. Suggest that when having pictures made of persons gathered around a new piece of apparatus, meetings, groups etc., an eye to the posture of military personnel should be given to avoid a slovenly appearance—hands in pockets, leaning against some object, smoking or holding cigarettes. This tends to lessen the interest and also reflects on the discipline of the Armed Forces of which we are all proud.

WILLIAM C. BOERNER, AA2CS

EDITOR'S NOTE: Thanks Bill, for calling attention to an important phase of picture editing. It is hoped that the next issue of the BULLETIN will carry an article covering the mechanics of submitting articles and photographs for publication and offering some tips to individuals on how to plan and write for publication.

PHILADELPHIA, PA.

I saw mention of MARS station at Aberdeen Proving Ground. If you have space in the next BULLETIN, would you mention the fact that Frankford Arsenal now has a MARS station. In the near future it will be reporting regularly into as many of the MARS nets as possible. In addition, we are planning on conducting a training course for MARS operators and possibly convert these operators to active members in the future.

J. S. VAN DYKE, JR., A3ELI
Custodian AA3WBI

HEADQUARTERS 8TH NAVAL DISTRICT
NEW ORLEANS, LOUISIANA

Noted a discrepancy in MARS BULLETIN of March 1953 . . . Page 4 shows a photograph of two persons operating a listed "TCS–12" transmitter converted for 10-meter operation . . . . It is believed that the equipment actually shown is a "TBY" transceiver whose frequency range is 28–80 mcs in 4 bands, with no modification necessary for 10-meter operation . . . . Enjoy getting the MARS BULLETIN and my personal association with MARS communications.

DANIEL T. BAIRD, A5SPZ

FARMINGDALE, N. Y.

I am a recent MARS member. The BULLETIN is very interesting and I enjoy reading it. 73.

HARRY J. DANNALS, AF2TUK

TRANSPORTATION OF MARS EQUIPMENT

Part 8002 of Joint Travel Regulations, 22 December 1950, provides for shipment of professional books, papers and equipment certified necessary in the performance of official duties without charge against prescribed weight allowances.

MARS equipment utilized in accordance with SR 105–75–1 or AFR 102–3 is considered to be professional equipment within the authorization included in above cited Joint Regulation. No additional authority for shipment of MARS equipment by individuals subject to Joint Travel Regulations is necessary.

CUB SCOUTS WATCH MARS OPERATIONS AT BOLLING AFB ON ARMED FORCES DAY

ARMED FORCES DAY—1953

Early reports, made as this BULLETIN went to the printer, indicate that the 1953 Armed Forces Day MARS participation figure for copying the Secretary of Defense message is smaller numerically than for last year, but larger percentagewise. The figure for this year is 295 persons who copied the 25 w. p. m. broadcast (see inside front cover) and 137 perfect copies. Stations AIR, NSS and WAR transmitted the original message at 2000 EST, while AIR, NPG and WAR transmitted a paraphrased version of the message at 2400 EST. W-2 conditions (very poor) made reception difficult.

Certificate Winners:

W1's: BDI, CBT, FPS, IIB/4, LV NC, WPR, YGV;
W2's: BO, CVW, CWK, IGS, JB, LYH, PFL, RUK, SHZ, TUK, UAP, VMX, VNJ, WBT, WC, WH, WVE, ZMK;
W3's: BHK, CA, FFN, GJY, MCG, OSX, PDJ, PTZ, QCB, QQS;
W4's: AGR, CH, KE, KJ, KUI, LYV, NWO, OXX, SDR, SR, URF;
W5's: BI, EGX, FAL, HNW, JPC, NEL, NIY, OTH, RKB, SKG, SPH, TOU, YMT;
W6's: AXV, BVY/4, CAJ, CBX, CJ, CRT, DCH, DDE, DTY, FJW, GQY, NAZ, OWP, PQ, ULL, WPI, YB, YHM, ZPX:
K6's: EA;
W7's: BJY, BVZ, KQV;
W8's: FFK, FLA, HS, HWZ, KNX, SDD, WVL;
W9's: AKP, ANB, BA, JMG, NTJ, UBW, UC:
WØ's: KXL, MOS, NGZ, SPR, WMH;
KG4's: AO:
KG6's: ACH, ADG/5;
KH6's: ABR, ARB, FX;
KP4's: KD, PM;

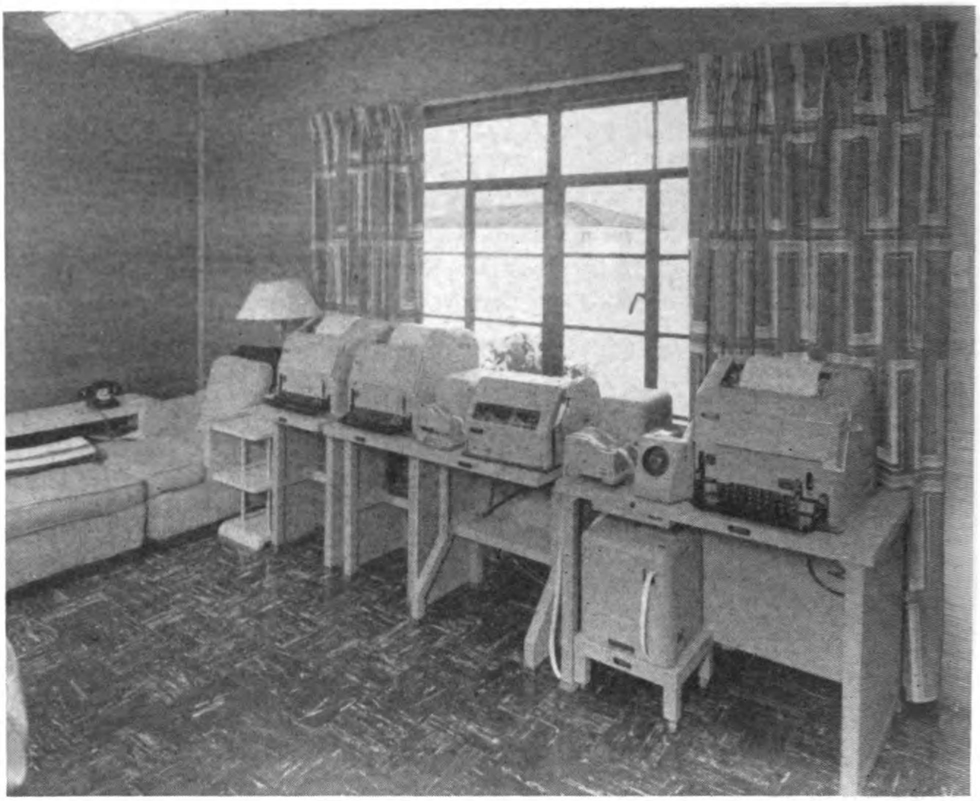
Larry M. Bane, William J. Beetham, John H. Bennett, Eugene Bergeron, George W. Blankenship, Charles F. Carpenter, Bernard I. Cohen, Turner Cook, Oscar F. Curtis, Clifford E. Darnell, S. Natale Di Lorenzo, Walter C. Glass, Jr., Enrique O. Gutierrez, Howard D. Haller, Lester R. Hillman, G. L. Hodges, Jack Howell, P. P. Lutzen, Donald James Mauthe, Joseph T. Peccini, James H. Reed, Derald E. Rogers, Robert G. Schneider, Keith D. Sullenger, D. C. Timmons, Bernard Weeks, Peter E. White.

MILITARY-TO-AMATEUR TESTS

Operating on military frequencies, AIR, NSS and WAR worked amateurs in the 75, 40, and 20 meter amateur bands. Due to the W–2 propagation conditions contacts were limited. Special Armed Forces Day QSL cards have been sent to all stations worked.

Station AIR was manned by A/1c Thomas Greenhalgh (AF1QIY), T/Sgt Howard Riddle (AF4SDK), S/Sgt Wayne North (AF6TOQ), A/1c Norman K. Hester (AF9CSK), A/1c Lawrence Rudolph (AFØQHK), A/1c Robert J. Callahan, S/Sgt Francisco X. Guiterrez, A/2c Clarence S. Lewis, A/2c Jane Nolan; S/Sgt Denis H. Rapier, S/Sgt Mary G. Shives, and S/Sgt Hugo Williams.

NSS operators were Cdr. R. E. Coleman, USNR (W1NK); K. Stern, ET3, USN (W2ANM); Cdr. K. R. Medrow, USNR (W3MCG); Ethel M. Smith, RM3, USNR (W3MSU); LCDR G. C. Dixon, USN (W3NZF); J. L. Lambert, RM1, USN (W3SSL); W. L. Makofsky, RM2, USN (W3VDI); Capt. R. R. Hay, USN (W4LW);



Amateur Station W6ITH radioteletypewriter equipment used in copying the Armed Forces Day RATT message: Left toright—two Model 15 send-receive teletypewriters; Model 14 typing-reperforator and automatic tape transmitter-distributor; Model 19 automatic sending-receiving page and tape machines with nontyping reperforator underneath. Three to four circuits can be operated simultaneously.

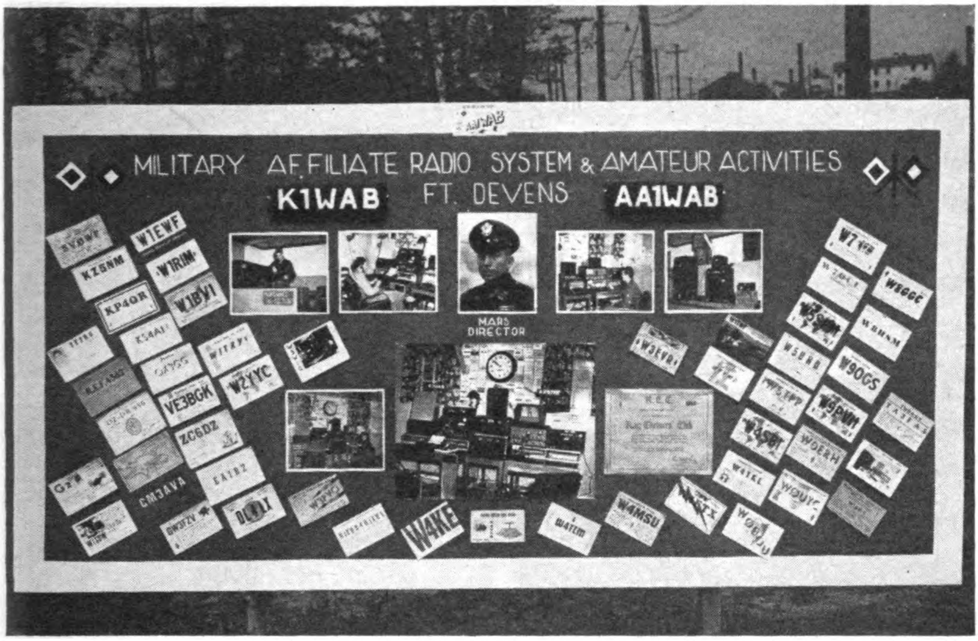
LCDR F. O. McDonald, USN (W4RPI); Lt. L. C. Moore, USN (W4UCN); R. A. Glendenning, RM2, USN.

Operators at WAR were SFC Frank Stoll (KL7AOX) and M/Sgt Paul E. Allyn (A4EEP). At WAR1 were Maj. James A. Long (A3UWI) and PFC Paul Weaver (AØMOS).

AIR made 125 contacts on 3 amateur bands, operating from adjacent MARS frequencies 3497.5 (A1), 7635 (A3) and 14405 (A3). WAR made 73 contacts on 2 bands, operating on frequencies 4085 (A3) and 6997.5 (A1). No calls were heard on the 1.8 to 2.0 megacycle band. Maj. James A. Long (A3UWI) and Pfc. Paul Weaver (AØMOS) operated the 75 meter frequency from MARS Mobile Unit No. 1 which was set up for display at the Armed Forces Day show at Bolling Air Force Base.

NSS made 144 contacts on 3 bands, operating on frequencies 4015, 7375 and 14385 (all A1). KP4PM worked NSS on all bands.

WN5WYT and WN7SPD were the only novice stations contacted. The following amateurs worked each of the 3 military stations on 1 or more frequencies—



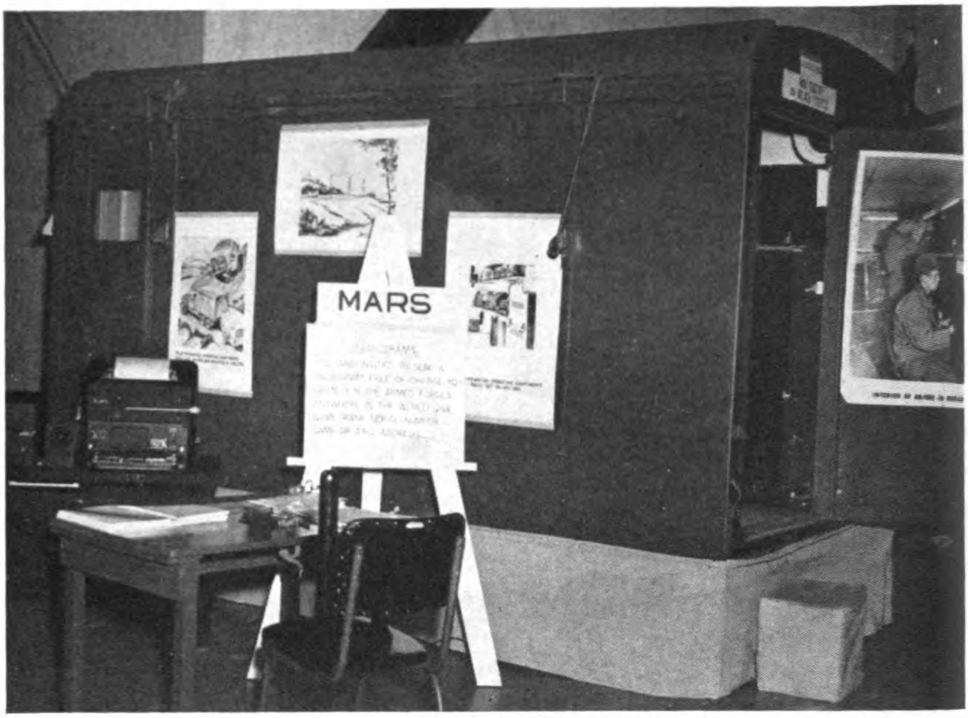
This sign attracted many visitors at the AA1WAB Armed Forces Day Display.

W2's: LV
W3's: FNO, HC
W4's: ANK, PYN, SR
W5's: JPC, HNW
W6's: CJ, FHW
WØ's: SPR
KP4's: PM

Considerable interest was shown in the amateur radioteletypewriter copying event. The large number of persons who submitted copy testifies to the fact that amateurs do have teletypewriter equipment. It is believed that this event will grow in time to become one of the better known contest events. Letters were sent to participants in the event this year.

FORT DEVENS—AA1WAB

The Post Signal Office, 24th Signal Service Battalion and 25th Signal Construction Battalion set up an Armed Forces Day display which featured acceptance of messages for transmission via Mars and amateur radio facilities to Armed Forces personnel overseas. The messages were accepted at the display site, passed by Post Signal facilities to the Mars station and then transmitted by radio. More than 200 messages were received from visitors and sent via Mars, according to Maj. Howard J. Carpenter, Post Signal Officer.



This Fifth Army Headquarters MARS exhibit was on display Armed Forces Day at the Museum of Science and Industry, Chicago, Ill.

USARPAC

As usual MARS played an important role in the Armed Forces Day activities at Headquarters, United States Army, Pacific. An amateur radio station KH6USA/KH6 was established at Ala Moana Park, Honolulu. Since there were no permanent buildings in the display area, the station was installed in an open-ended tent to protect the equipment and operators from possible inclement weather. A rotary beam antenna was mounted on a 35-foot pole adjacent to the station. Receivers and control equipment were mounted in racks. A BC–610 transmitter was used with power furnished from a PE–95 unit.

Propagation conditions were poor in the morning, resulting in a back-log of messages at the end of the day. These were cleared from the permanent location at Fort Shafter. The station was open from 0800 to 1600 hours; 181 messages were accepted for transmission.

LAS CRUCES, NEW MEXICO

The Chamber of Commerce of Mesilla Valley and city officials of Las Cruces assisted MARS members of Las Cruces in planning an effective Armed Forces Day activity. Hiram Miller (A5QKJ), John Curry, (A5UAR), H. Lisle (A5UMO), and Yetive Matthias (A5DRA) operated the MARS station which was set up in the Chamber of Commerce building in downtown Las Cruces. The equipment and call of A5UAR were used. MARS stations A5RFK, A5VHW and AA5WSP stood by to receive and relay traffic.

U. S. GOVERNMENT PRINTING OFFICE: 1953

MARS AMATEUR EXTRAS

As previously announced the MARS BULLETIN is glad to publish the calls of MARS members who are licensed by the Federal Communications Commission as Amateur Extra Class Radio Operators. Names of MARS members who qualify for this list should be furnished to The MARS BULLETIN, Room BE–1000, The Pentagon, Washington, D. C. The following names were furnished as of 1 June 1953:

Ludlow P. Mahan, W1BVI (A1BVI)
N. A. McIntyre, W1BQ (A1BQ)
Lester Reiss, W2BR (A2BR)
William C. Boerner, K2CS (AA2CS)
Harry J. Dannals, W2TUK (AF2TUK)
G. S. Van Dyke, W3ELI (A3ELI)
John M. Thompson, W3HC (A3HC)
Milton I. Schwalbe, W4VP (A4VP)
Keith Maring, W5KSW (A5KSW)
Norman Wehrli, W5JPC (A5JPC)
Bill Stewart, W5MU (A5MU)